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TELEPHONE ENGINEER

Vol. II CHICAGO, NOVEMBER, 1909 No. 5

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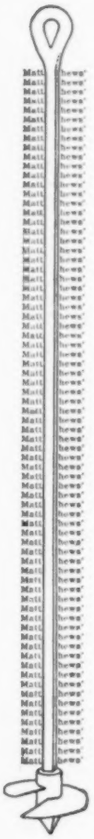

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TECHNICAL FEATURES OF CONVENTION.

MEMBERS of the executive committee of the International Independent Telephone Association held a two days' session at the Auditorium hotel, Chicago, October 8 and 9, and laid plans for the annual convention December 7 to 9. One of the most important features decided upon was the holding of sessions apart from the business meetings, in which telephone engineers and the technically inclined may engage in practical conference.

This plan was tried experimentally last year, and with excellent results. Its permanent adoption can not fail to appeal to the many practical independent telephone men who feel that a convention should be something more than a political meeting. While former conventions, both state and international, have been marked by many splendid papers of technical and engineering interest, the fact that such papers were delivered to the whole body of the meeting instead of being confined to its technical contingent, put something of a damper upon their reception and consequent effect.

Unquestionably a technical paper makes its best impression when read to a purely technical audience. Discussion and criticism are much freer, and this freedom adds not a little to the final value of the subject. Segregation of the different interests cannot but make for efficiency in the conduct of conventions, and the International Independent Telephone Association, in adopting this plan, is merely recognizing the methods pursued by other great associations.

There is another improvement which has been suggested in connection with the telephone conventions, and used by many associations working along parallel lines. This is the printing of the papers for distribution among the members before the convention. The value of this action is obvious. With the closest attention and the best of memories, no man can retain all the excellent ideas which enter his mind by way of his ears. The voice leaves no record, and the average listener cannot analyze the statements he hears with sufficient rapidity to contribute intelligent discussion or even ask the questions which might dissolve the obscurities of the subject.

Nor does the publication of the papers by the trade journals after the convention assist in the interchange of ideas, which is as important as the paper which causes it. Furthermore, the frequently long delay in such publication tends to belittle the importance of the subject and to discourage interest in an already forgotten theme.

The thorough digestion of a paper before it is heard encourages the preparation of notes for discussion, and the result of this co-operative work is a well-rounded and complete consideration of the prob-

lems treated, instead of a mere expression of the views of an individual. It can hardly be doubted that the adoption of the plan of prefatory printing of the papers to be read at the International convention will work wonders for the development of telephony. Many extremely valuable papers will thus acquire a permanency and completion that they cannot have at present. There will be a greater incentive to prepare papers, and possibly a tendency toward greater care in their preparation—although no fault can be found on that score at present.

The result cannot but be beneficial to the whole art. Just as the authorship of a good technical book adds to the reputation and standing of an engineer, so the technical transactions of an association or society, when perpetuated, add to its power, stability and dignity. It is to be hoped that the International Independent Telephone Association will see its way clear to make this practice a permanent feature.

Gansey R. Johnston, general manager of the Citizens' Telephone Comapny, of Columbus, Ohio, has the matter of gathering material for papers and discussions for the convention in charge, and those who have any ideas along those lines ought to lose no time in communicating with him. Mr. Johnston was the chairman of the technical conference at the last convention, and a better man for the work could not be found. It is safe to say that if any ideas for the improvement of this branch of convention work are rejected by him it will be because he has found them wanting in some essential. But Mr. Johnston can accomplish little for the conference without the immediate co-operation of the interested members; for the time is none too long for the efficient division of labor. There is a natural tendency to request papers from those whose previous performances have proven them capable and reliable. The consequence is that there are others just as capable and reliable who are not given the opportunity, and perhaps have no desire to contribute to the general fund of information. New authors are the life blood of literature, and there is no reason why the same rule is not applicable to technical conferences. Let us have some new names on the program—besides all the old ones, if it be possible. More and shorter papers might be a good condition to make.

Nor should it be forgotten that the technical expert is often the most inexpert in the preparation of a concise and elucidative paper upon his most familiar subject. Men are too apt to go outside their own experience in preparing a paper or article, because what they are familiar with seems too commonplace to them to deserve publicity.

It is also obvious that those papers which will not receive the scrutiny of the members before they are read in convention cannot properly use any amount of figures or dimensions, except for purposes of direct comparison. Nor are tables and curves of any great value for purely transient consideration, although they are most valuable when put in printed form for prior study. If there is much illustrating to be done, a projecting lantern should be requisitioned; an illustrated paper is always the most interesting, and an illuminated illustration is the most intelligible and attractive. Slides are readily prepared and inexpensive, and their use will tend to increase the number and excellence of the illustrations used.

Finally, for the benefit of those who, while past-masters in practical operation, are novices in the preparation of papers, let it be said that a paper need not be read as it would appear if printed in a trade journal. In reading, the use of the first person is not only admissible, but often desirable. The reader need not hesitate to repeat himself when referring to specific parts or principles. And he should remember that illustrations are always better than explanations, and that the value of a paper is dependent upon neither its length nor its amount of data.

It is the hope and belief of Telephone Engineer that the coming convention will be the brightest and best and most potent of all the International Independent Telephone Association has ever held. If it is not, it will not be the fault of its officers and executive committee, who have labored hard in the cause. The independents have always had problems; but let us hope that most of them will dissolve in this meeting.

NEED FOR A CENSOR.

WHEN the insurrection within the ranks of the American Telephone and Telegraph Company reached its climax by removing Mr. Fish and substituting Mr. Vail, it also cast aside many of the archiac traditions of the old regime. From the moment Mr. Vail assumed the duties of his enormous charge, there has been improvement in its methods. The changes are nearly everywhere apparent.

It required courage to abandon some of the pet hobbies of the old management. Mr. Fish insisted upon a net revenue of not less than two dollars per telephone station to accrue as a direct, royalty levy. Mr. Vail swept this arrangement aside with a fine contempt and set about to strengthen the financial conditions of his concern by straight, commercial practices.

Every tub was made to stand upon its own bottom—brigandage of the high-handed order ceased. The things that were done are a matter of record. The results are startling.

The details involved by the new and larger order of things have not been without criticism, but we marvel that some one has not been assigned the duty of censoring the sub-licensee papers—these little house organs that might perform creditable service if they were confined strictly to the work at hand. These otherwise creditable journals persist in printing insinuating items that must reflect against all telephone securities. Just why they do it is past our reckoning. They feed the fire that perpetuates the independent telephone journal of retaliation!

The *Telephone Gazette* prints the following item:

> "The independent telephone company in competition with the Wisconsin company, at Delavan, Wisconsin, has passed through the hands of a receiver and been sold at a junk price to the Wisconsin company."

What motive prompts the spread of such news in Bell papers? Is it good for the investing public to know that the Wisconsin company is buying junk at Delavan? Is it less injurious to the Bell interests to lend publicity to a small independent calamity than it is to the independents themselves? We think not.

It is our earnest wish that the far-seeing powers at Boston will cause to be eliminated those things which must tend to injure the stability of the telephone business as a whole. Remarkable in many ways, nothing in telephone operating can be compared to the always present facts—

an ever increasing directory of subscribers; a constant waiting list; a saturation point yet to be attained.

The house organs of the Bell companies are unwittingly contributing injury to the business—are causing the blame to rest upon a purely imaginary "iniquitous press bureau"—and should be called to account.

INSTRUCTION IN TELEPHONE ENGINEERING.

THERE is manifest, as the science of telephony grows older, a tendency to regard telephone engineering as a distinct profession, rather than as a branch of electrical engineering; just as most of the constructive sciences are offshoots of civil engineering.

Unitil recent years the profession of telephone engineering boasted a smaller percentage of college graduates than any other distinctly technical vocation. This condition has altered gradually with the natural growth in importance of the industry until today many of the engineers who are quietly making telephonic history in the field and in the experimental laboratory hold diplomas in electrical, mechanical or civil engineering.

In some ways the work of the telephone engineer calls for broader training than that of his brother in electrical engineering. The work of installation, from the development study to the giving of service, requires almost the technical omniscience of civil engineering in its broadest application.

Telephone engineering is not a specialized profession. On the contrary, it contains within itself material for any amount of subdivision into special studies. Its importance and complexity are such as to entitle its alumni to a definite degree. When its study shall have been incorporated into the curriculum of our universities as a distinct course, the degree of *T. E.* will become as familiar as the older technical suffixes.

PROBLEMS OF CONSOLIDATION

HOWEVER regrettable the consolidation of competing telephone systems in a community may be, the problems which it engenders must be carefully considered, to the end that good service shall continue.

The technical problem may even be said to begin before actual consolidation takes place. At DesMoines, Iowa, for example, the past month has witnessed a bitter fight on the question of whether it was advisable to physically merge the two systems at all.

For some unexplained reason this proposition, involving technical and economic considerations of a high order, was submitted to a vote of subscribers of both systems. It is not surprising that the result of this lay vote was eighty per cent in favor of the single system. Even under normal competitive conditions the public has been educated to the "natural monopoly" point of view by interests which have made, and are still making, every effort to inculcate that theory into our everyday life. The public does not care to reason on this proposition; it has its own affairs to attend to. There is no question that if the independents had given more publicity to the principles of telephone competition than the Bell has to the slogan of monopoly, then telephone competition would be, to the lay mind, the accepted condition of services. But at DesMoines even normal competitive conditions had been abolished before the question was put to the subscribers. The true situation was merely that the Bell Company was asking its subscribers whether it should maintain one or two local systems. It is rather remarkable that anybody took the trouble to answer it.

But some of them did answer it; about thirty-three per cent we are told. And of this thirty-three per cent, eighty per cent voted for the single system. We can now begin to look for some fresh Bell arguments on natural monopoly, reinforced by the DesMoines ballot. Superficially, the case affords good material for such argument; but it should not be allowed to go unchallenged. Monopoly already had the reins when the vote was taken, and the people knew it. Under the circumstances, a vote for two systems would have been anomalous.

DesMoines subscribers have shown their belief in two systems by supporting two. Vote or no vote, they had no say in the consolidation. And if conditions ever arise in the service demanding compulsory correction (as they often will under monopolistic rule) DesMoines subscribers will be prepared to make such correction by establishing competition again.

INDUCTIVE DISTURBANCES.

PERHAPS if the early builders of telephone lines could have foreseen the possibility of a network of high potential, alternating current conductors crossing the country in every direction, even their hardihood would have felt discouragement. So nearly universal has become the use and so rapid the development of alternating currents in the past few years that it is almost impossible to run a telephone line for any considerable distance and escape their influence.

The extreme sensitiveness of the telephone instruments, so vital to its performance over long lines and under adverse conditions, becomes a positive menace to its efficiency in the neighborhood of an alternating current line. Inductive currents too small to be measured will cause enough movement in a receiver diaphragm to be perceptible to the aural nerve.

But every action has its reaction and every case of inductive disturbance has its cure. Mr. J. B. Taylor, in a paper read before the A. I. E. E. has treated the subject quite exhaustively. In abstracting the paper for reproduction in TELEPHONE ENGINEER the editors have attempted to preserve all that is of vital importance to telephone men. Taken all in all, Mr. Taylor's paper is an important contribution to the electrical and telephone literature of the day.

OUR FIRST PRIZE WINNER

TELEPHONE ENGINEER takes pleasure in placing before its readers this month the paper on "A Remedy for Telephone Incivility," which won the first prize of fifty dollars in the prize contest which closed September 1.

The author, Jay Houghtaling, is a practical telephone man, who has given considerable thought to the problem of inculcating habits of courtesy among telephone users. His analysis of the conditions is logical, and his suggested remedies, while they may not accord in detail with the individual views of other thinkers along the same line, will be found to cover in principle all possible methods of dealing with the uncourteous public.

The conditions of the contest could have been fulfilled with either of two treatments of the subject. The first treatment would consist in addressing valuable suggestions to the operating company. The second treatment would involve producing matter for the actual consideration of the subscriber, to be placed without ma-

terial change directly into the hands of the telephone user. It is obvious that Mr. Houghtaling's article is of the first class mentioned.

We do not expect to witness much improvement in the conditions we are combating for a considerable time to come. Such developments are, as Mr. Houghtaling says distressingly slow as a rule. But if TELEPHONE ENGINEER, through its prize winners, has helped the cause in any degree, we are well content.

INDEPENDENTS ARE BUSY.

THE Continental Telegraph & Telephone Company, 15 Exchange Place, Jersey City, N. J., was incorporated Friday, Oct. 8, 1909. The intentions of the new company are "to unite and consolidate any telegraph, telephone or cable lines and systems, and to equip, maintain, operate, rent, sell or otherwise dispose of all or any part of any such consolidated system or systems." The stock consists of 500,000 shares of a par value of $100 each, equal amounts of common and preferred. The incorporators who are named are not active in the telephone business, but it is well known that the Continental company will be identified with independent telephone interests and is to be used as a holding corporation to bring under one control and management the independent long distance lines and some of the important city systems.

The conferences of independent operators held at Niagara Falls, Sept. 4, 5 and 6, and at the Auditorium hotel, Chicago, Oct. 8 and 9 were vitally interested in the Continental's proposal.

As early as the middle of October, the report became current that the Keystone Telephone Company of Philadelphia had closed a deal with the Continental, affecting traffic agreement to lease its lines to the prospective long distance operator. Chronologically, there was a characteristic Ohio love feast at Hotel Berry, Columbus, at which that idol of independents, Frank L. Beam presided as toastmaster. The speeches were arguments favoring centralization of operation and management. This good-fellowship rally was largely attended by stalwart independents from all over the state and was held October 14th.

The very next day, the incorporation of the Ohio Home Telephone Company, capitalized at half a million, was announced. The Ohio Home, as a leasing company, was to have taken over the United States Telephone Company. The United States Company has a capital of $5,000,000, approximately $4,000,000 outstanding and $2,600,000 bonds. There is nearly 30,000 miles of copper wire connecting many independent systems. The control of the United States company was vested in a board of trustees with power to act. A large part of the securities belonged to the Everett-Moore syndicate, of which every telephone man has knowledge. A rate war was directed against this big Ohio long distance company early in the year by the Central Union company. The plan of leasing by the Ohio Home was to conserve the property; rallying the full independent support.

We have said that the Ohio Home company was to have taken over the United States company. It didn't. Its intentions were good, but its action was not fast enough. With everything practically arranged for the transfer, Jas. S. Brailey, Jr., on October 17, was announced as the purchaser of the United States Telephone Company, as well as the control of the big Cuyahoga system at Cleveland. It is said that nearly $2,000,000 was required to swing the deal. Telephone men are wondering where Mr. Brailey got the money. He refuses to name his associates and flatly denies he is acting in any other capacity than as the good independent he has ever been known to be. It is alleged that Mr. Brailey is personally interested in the Continental Company. He attended the conferences of independents at Niagara Falls and Chicago. He was not present at Columbus, but he is usually the big noise at independent gatherings. If he was pulling off a little purchase involving something like two millions of dollars and New York was the proper place for the negotiations, one spread at Columbus might have been overlooked.

It will be remembered that nearly a year ago the Columbus crowd had practically completed arrangements similar to those proposed for the Ohio Home company. At that time the Everett-Moore trustees blocked the deal after announcement had been made that it had carried successfully. The blame for this was laid to Mr. Brailey, who has now come into control of these vast interests. Mr. Brailey dealt with the Cleveland Trust Company, and it is said that he paid as high as $80 a share for the preferred and $40 a share for the common to obtain the control of the United States. The announcement is also made that Everett-Moore are entirely out of the telephone business, which gives further proof that nearly $2,000,000 passed between Mr. Brailey and the trust company.

TELEPHONE ENGINEER will be glad to encourage the Continental Company of New Jersey, the National Telephone Corporation of Pennsylvania, the Ohio Home Telephone Company of Cleveland, and any other open effort to maintain competition in the telephone business. It is to be regretted that Mr. Brailey's unwillingness to tell who he was representing in these large negotiations have given the skeptics an opportunity to criticize. What is one man's business should not be everybody's affair even if it bears the earmarks of suspicion. Everything that Mr. Brailey has been buying is making money and it isn't always difficult to get money when you can present favorable schemes. No business requires more money for development than the telephone business, and as one who must be interested in all telephone progress, TELEPHONE ENGINEER will accept Mr. Brailey's statement that he is working for the best interests of independents.

As late as October 23, Mr. Brailey was still writing denials that he was not acting for the good of independent telephony. Here's hoping the next thirty days will give something more definite than the last man's guess.

THE HULFISH SERIES INTERRUPTED.

WE regret to state that up to the moment of going to press, manuscript and drawings for Lesson XI of "How to Read Telephone Circuit Diagrams," by David S. Hulfish, had not been released from some mysterious department of the postoffice. The bundle of copy was sent by registered mail, which may account for the hold-up; since letters and parcels sent from the same point at a later date have been received in good time.

The intense interest which Mr. Hulfish's series has aroused among students of telephony makes our regret at this unavoidable interruption the more poignant. Duplicates of the copy and drawings have been sent for, however, and will appear as usual in the December TELEPHONE ENGINEER.

A Remedy for Telephone Incivility

By Jay Houghtaling

IF ANY one person knows the true nature of a certain group of people it is the telephone operator who answers their calls. This is especially true in the smaller towns where magneto exchanges make listening-in occasionally almost necessary and where eavesdropping is not considered such a great crime as it is in the larger exchanges. The operator in such an exchange can drop in. as it were, on the subscribers when they are entirely off their guard. and sees, or rather hears, them as they probably are in the privacy of their homes, with all artificial restraints taken from them and the necessity for being civil and polite removed. I believe the last clause sounds the keynote of the cause of incivility on the part of telephone users; the lack of "the necessity of being civil and polite."

The causes of telephone incivility are inherent in the individual. The person who is naturally a boor or a churl will almost invariably show his traits when using the telephone because the restraint which is born of fear is lacking. Probably the majority of people are restrained, in their personal relations with others, from doing and saying rude things, by fear. Not concious fear of that particular individual, perhaps, but a feeling which causes them to respect the rights of other people; a heritage from the times when insults were resented by a demand for satisfaction more or less immediate, and, perhaps, a fear of adverse public opinion.

The people who are polite from an innate desire to be kind and considerate do not need to have a lecture on how to be polite when using a telephone. Their natural instincts tell them what to say and do.

The uncivil telephone users may be divided into two classes:

First—The cowards who take advantage of the fact that several miles of wire intervene between themselves and their victims to use language, tones and inflections they would never think of using in the actual presence of the same individuals. Such persons are usually found in more or less menial places; but.

"I wish to express my thanks for your check for fifty dollars, as well as my appreciation of your kindness and that of the judges in awarding me first prize.

"As to a detailed account of the preparation of the article, it was a subject to which I had given considerable thought for a number of years, as the incivilities of most telephone users are glaringly apparent to even the most casual observer, consequently the article was merely an expression of opinions which I had held for a long time.

"For your information I give a summary of my telephone career. I began as night operator in an exchange of approximately 200 subscribers, while attending high school, and served in that capacity approximately two years. From this I was promoted to local trouble man, and later had charge of both the exchange and toll trouble, the company with whom I was employed having approximately 200 miles of toll lines. I served in that capacity between two and three years, and then entered the University of Minnesota, taking the electrical engineering course. I took but one year's work at the university and then went with a larger telephone exchange, as foreman of the equipment shop. After acting as foreman for about two years I was put in charge of equipment construction, holding this position for a little over three years. For the last year and a half I have been acting as a salesman of telephone apparatus.

"It was undoubtedly my experience as an operator which gave me the most ideas for my article.

JAY HOUGHTALING."

unfortunately, their positions frequently bring them into contact with the telephone public.

Second—The persons who are ill bred or who, by nature, are blunt and brusque. These are found in all ranks of business, and some of them, who have climbed a little higher than their fellows, doubtless imagine that their mannerisms have been a contributory cause of their success.

An individual of the first class we might dub "the telephone bluffer;" an individual of the second class "the telephone boor."

What remedy can we apply to these two cases? Certainly no panacea will ever be discovered for ills into which the human element enters so largely. Whatever is done, however, will have to originate with the operating companies, as they are the ones most seriously affected by anything which brings adverse criticism upon the telephone as a part of the business and social life of today.

The abuse of the telephone is largely a secret vice anyway, consequently it will be impossible to legislate it out of existence.

A campaign of education must be entered upon by the operating companies, assisted by the press, to eradicate the more common abuses of the telephone.

This campaign should first be directed against the employer, with the idea of repeatedly calling his attention to the great amount of injury which can be done to his business by even one employee who is discourteous or unnecessarily abrupt in his manner of using the telephone. He should be shown what a big door to his establishment a telephone really is and that an employee who is uncivil over the telephone should no more be tolerated than would an impertinent office boy who offends callers. Constant dwelling on this subject, presenting it in its different phases and bringing gentle but firm pressure to bear on employing subscribers, will have its effect through the power of subconscious suggestion if nothing more, and will result in employees being educated along the line of the proper thing to do and say when using the telephone, just as now they are shown what is necessary in regard to their other work. If an employee cannot properly handle the telephone calls which are necessary in the line of his duties, he should be shifted to some place where he will not antagonize the telephone public.

The other class is a much more important one and also harder to deal with, as in it will be found employers themselves as well as their employees. Business men in the press of a busy day, superintendents hurrying to catch up with their work, shippers with limited time to get their goods to the freight houses; all these are guilty of incivility over the telephone many times every day. How can these people be attacked on a point which they would probably consider one of personal liberty? Only through a campaign of general education. Let the "Do it now" and "Kwitchergrowlyn" placards be replaced by some bearing on the subject of telephone incivility. These might be arranged to fasten to the trans-

mitter of the telephone by means of the mouthpiece, thus being always in front of the telephone user. Pat phrases such as "The fellow at the other end may be a human being too," or "The Golden Rule applies to telephone conversations as well as other things," or "Don't bluff just because the other fellow can't reach you," etc., would serve to remind impolite talkers continually of their habit; and as "Constant dropping wears away the stone," so this continual hammering would eventually have its effect. Results would, admittedly, be slow, but permanent betterments are nearly always attained slowly—discouragingly so, usually.

There are some things which might be said that would apply almost universally. Thoughtless habits have crept into the vernacular of telephone users and some of them tend to call forth discourteous treatment from the party called. For instance, a person will call up some number and when the party answers will blurt out "Who is this?" Yet the same person would never think of stopping anyone on the street and abruptly asking "Who are you?" No indeed. He would say, "Pardon me. Are you Mr. Blank?" Why not do the same thing when using the telephone?

Again Mr. Blank will perhaps leave word with a second party that he can be reached at such and such a telephone number. When that person desires to call Mr. Blank he unthinkingly calls up the number designated and abruptly announces that he wishes to talk with Mr. Blank. Perhaps that means considerable annoyance and trouble to the party who has to find Mr. Blank, and their manner is by no means pleasant as a result. Of course Mr. Blank is the one most at fault in that he allows his friends to impose on people in that way, and such practices should be discouraged in every way possible. But could not the calling party have made his request in some more polite form, such as "Would it be too much trouble for you to call Mr. Blank to the telephone?" Thus giving the person called a chance to decline or protest and certainly leaving a much better impression.

In short, the telephone offers an entrance to the homes and business places of other people by which we may enter and yet be invisible, and it is the fact of such invisibility that causes some thoughtlessly and others intentionally, to err.

Newspaper publicity, through pure reading matter advertisements, if it could not be secured otherwise, would help to call the attention of the general public to some of the ways in which the telephone and the telephone public are abused. Perhaps, however, such a method would be too expensive for the results obtained compared with the more direct methods suggested previously.

To sum up very briefly: The need of reform is admitted; it must be secured through education; the campaign of education must be planned for the mean, the ignorant and the thoughtless; it must originate with the operating companies; be fostered by the press; and it must be persisted in until telephone courtesy becomes as near second nature as human selfishness will permit.

Telephone Courtesy

One of the most interesting recent utterances on the subject of telephone courtesy is that of the American Radiator Company, which published in a recent number of its magazine the following:

"The evolution and spread of telephone service has been so gradual that we can hardly measure its tremendous importance to the business and social world today. Business men who hark back to the time when all business was accomplished by word of mouth, stroke of pen, or through the expensive and circumscribed service of the electric telegraph, indeed wonder how human affairs ever progressed with any degree of smoothness before methods of communication were made wonderfully easy by the modern telephone. It plays a tremendous part in the world of commerce—an invaluable agent of human progress. Being continually impressed by the highly important part which these elastic instruments play in our own business, our executive committee has made this phase of modern industrial progress a subject of very particular study and investigation, and particularly the telephonic methods employed by the great corporations of our day. It has been found that most all of the large successful corporations in which special investigations have been made, pay most strict attention to the rules of courtesy and judgment in the use of the telephone. They all agree that this instrumentality must be maintained at a high stage of perfection to maintain their position in their several spheres of usefulness.

Our executive committee is convinced that those in charge of the telephone service utilized throughout all of our company offices are entitled to much commendation, because of the excellent work which is being accomplished to maintain our company's reputation for an agreeable, polite and accommodating telephone service.

About five years ago our president prepared a special telephone card for posting at all of our telephones throughout all our offices, and we here reproduce the sentiments presented on this card:

AFFABILITY, GOOD CHEER, COURTESY.

Let us all keep in mind that we are speaking for the American Radiator Company, and that our manner of speech will convey a favorable or unfavorable impression. Many an order has been lost because of a momentary lapse from courtesy. Let us always keep in mind that to be affable and courteous will result largely to the benefit of our organization.

We should and do consider it a distinct favor when persons call us on the telephone, whether it be to record an order or to make inquiry about a subject, however trivial or unimportant.

If this thought is kept in mind, we shall always convey a message of good cheer to those who communicate with us either by telephone or by personal contact.

The experiences which our company has already had in exercising these factors justify our executive in hoping that the continued maintenance of our excellent telephone service may be regarded as one of the most important policies of our business life. Thus we may disabuse the public mind of many errors which attend the popular estimate of large incorporated business concerns. These institutions were formerly regarded as "soulless" corporations, but we are proving that it is possible to so conduct our relations with the outside public as to show that this company is not insensible to the demands of pleasant, agreeable and timely business communications, while, at the same time observing all the practical demands of business life. Not that it pays only in more business, but it makes life more pleasant, brighter, more worth giving out little contributions to the betterment of our fellows, and thus rubbing out the disagreeable which is bad for peace of mind, health and prosperity. We are all getting away from the ancient conclusion that people do not appreciate our endeavors to be courteous and accommodating—they certainly do. And other factors being in fair alignment, they will persist in patronizing the shops, stores, offices where they are 'well treated.' Call it human nature if you will, but it is natural and leads in the right direction."

A Telephone Bagpipe Lesson

The very latest thing in long distance telephoning has arrived, says the *St. Paul Pioneer Press.* Business deals have been put through and marriage ceremonies have been performed; a funeral service has also been reported, but the classiest stunt of them all was performed between Minneapolis and St. Paul—namely, a music lesson on bagpipes was given over the telephone.

The feat was performed by Captain George Sinclair of Minneapolis, formerly in the service of the late Queen Victoria as piper in the Scotch guards, and William Wallace Robert Bruce, a well-known piper of St. Paul.

Capt. Sinclair sat in his chair in the Mill City police headquarters, while Mr. Bruce, at his home, puzzled over a new hornpipe composed by William McKay of Ayrshire, Scotland. He appealed to his brother Scot in Minneapolis.

According to the captain the piece is a very difficult one and if your fingers are not pretty limber you are apt to get caught on it. There are crochet (not the kind worked with a needle), grace notes, several varieties of hemi, demi and semi quivers, and also six distinct brands of quavers in it. Therefore, when Mr. Bruce appealed to the captain for assistance the latter was "up against it" for a minute.

Placing his lips to the telephone transmitter he puckered them into a whistle and went through the knotty piece, note by note, getting in each and every grace note, crochet, hemi, demi and semi-quiver, and also all the quavers. He stopped for breath and then repeated the air.

There was an anxious silence and then from the St. Paul end of the line came the tunes of a bagpipe playing the McKay hornpipe just right. Next came a cheery voice saying, "Hoot awa, mon," which ought to mean in Gaelic, "well done, George, Scotland forever," and the music lesson, the first on record over the telephone, was over.

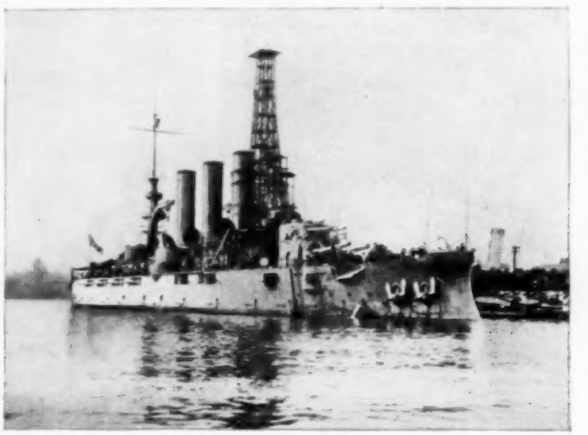
Telegraph and Telephone Extensions in Korea

According to Consul-General Thomas Sammons, at Seoul, the Japanese residency general authorities state that since taking over the telegraph and telephone lines in Korea, in July, 1905, the total length of the telegraph lines, then about 1,930 miles, of which 895 miles were used for military purposes, has been increased to approximately 7,000 miles. As for the telephone system, five years ago it existed mostly at Seoul, aside from lines on mining concessions, and the total length of the wires was less than 100 miles. Today it exists in all the principal cities, its length having increased to over 4,500 miles.

Telephone Equipment of a Battleship

By D. H. Braymer

IN the following description of telephone communication on board a battleship, reference is made particularly to that system of communication which is in general use and serves as the talking medium for the entire ship. On every battleship at the present time there are installed three separate and independent systems for transmitting speech from one part of the ship to some other part. These are the fire control system, the speaking tube system and the general telephone system, which is generally known as the ship's circuit, with central energy switchboard and operator. The first-named system is used exclusively for battle action and will not be treated in this article, since the apparatus is special and its application does not figure in the general system of communication throughout the ship.

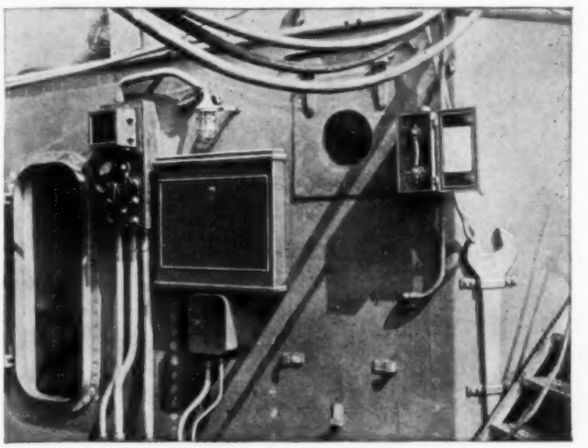


Battleship Rhode Island, United States Navy.

The communicating service by telephone on shipboard then will be confined to the central energy switchboard and its branches, which connect all the important official positions with other portions of the ship for the ready communication of orders or reports.

Through the courtesy of the United States naval authorities the writer was permitted to obtain photographs of the telephone apparatus on board the Rhode Island. These photographs have been reproduced and illustrate the type and method of installation, which is herein described.

The importance of communication on board a vessel of war cannot be overestimaed. The location of the different departments and the nature of the organization is such as to require as direct and reliable a system as can be obtained. Although the primary object of this article is to describe the type of telephone which is used for this service, it will also be the aim to show in a brief way under what conditions and to what real advantage the system operates in practical use.



Telephone Station on the Quarter Deck.

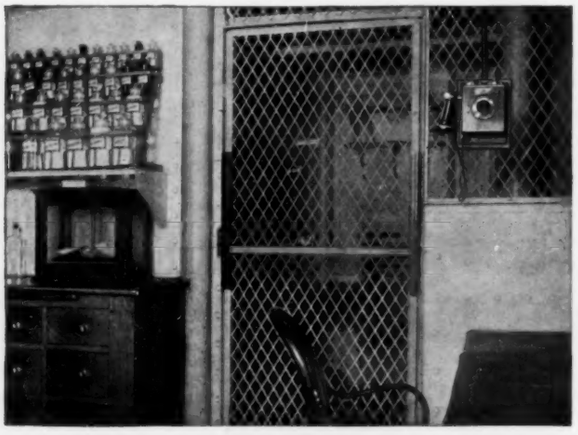
The central energy switchboard now in use on the battleship Rhode Island, and also on several other battleships, is known as the marine type, and was designed by the Western Electric Company for use in the navy. Although its design was made applicable especially to battleship service, the principle upon which the board was built is the same as that embodied in the cordless private branch exchange switchboard, which was originally built by the same company for the Bell Telephone Company. The special features which make it applicable to battleship use are its proof against dampness, its compact arrangement, which enables it to be installed and operated in much less space than the ordinary switchboard equipped with connecting cords, and the rapidity and positiveness of its action. The board is of the plugless and cordless type mentioned above, with a capacity of fifty substation lines, five connecting circuits and one trunk line. As the board is at present operated, however, there are only forty stations connected, the trunk line being connected only when the battleship is in port. This connection enables the board to be connected with any long distance line and operated as a private branch exchange.

The central station in which the switchboard is mounted is located near the dynamo room and is separated from it by sound-proof partitions. The board is mounted in a brass case which sets flush with the compartment wall, as illustrated, and is so constructed that when closed the containing case is watertight. All the apparatus necessary in connection with the board itself is mounted in a very compact manner on the inside of the metal case, and although this case is watertight, the sections are hinged and so arranged that all parts are readily accessible for inspection and maintenance repairs.

Energy for talking and operating the signals is supplied from a small motor-generator set, which is operated from the electric supply circuit. The motor-generator is of special design, the generator delivering energy to the busbars through a choke coil, and from there to the connecting circuits through retardation coils. For the ringing circuit, a second motor-generator delivers direct current. For emergency a battery equipment is used, which may be

either storage, dry or Le Clanche cells. The substatons are equipped with direct current vibrating bells. At the left of the switchboard is the low voltage distributing board, which controls the battery circuits, bell circuits and telephone circuits.

At the switchboard, each substation line and the trunk line ends in a line key and line signal. Magnetic visual signals are used for both the line and supervisory signals. The key levers are arranged so that they can be thrown over a considerable angle, so that the position of any one key is at once apparent to the eye of the operator. The board is divided into two key sections; the first key section takes care of 25 substations, the second of 15—that is, the first section consists of 25 keys with three cam levers and the second of 15 keys, also with three cam levers. This arrangement is due to the fact that the space allotted for the installation of the board was not sufficient to accommodate the keys when arranged in one section. On account of the two key sections there are at the left of these sections two sets of connecting circuit signals, which are numbered 1 to 5; correspondingly numbered signals in the two sets act in unison. The keys are placed with the axis vertical side by side in the case, giving three horizontal rows of 25 cams each in the first section and three horizontal rows of 15 cams each in the second section. Each cam has two positions besides the normal or middle position, and each key has six sets of operating springs, or three pairs of two sets each. Each one of these pairs is controlled by one of the corresponding cams.



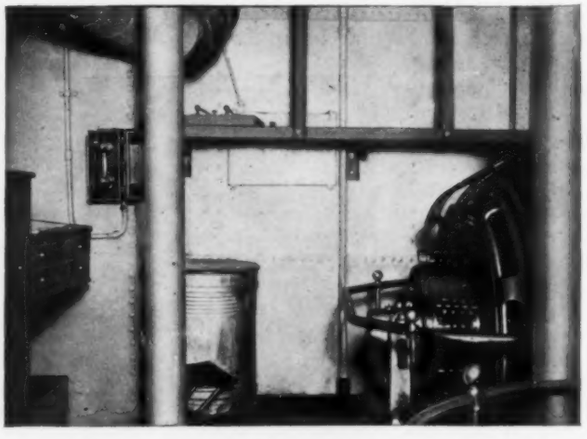
Telephone in the Ship's Dispensary.

Of the six sets of springs in each key, the upper five of these only, however, are used for connecting circuits; the sixth or lowest set of springs of the extension line keys is a ringing key for calling the extension station, the cam provided being arranged to restore automatically on being released, as is customary with ringing keys. At the right-hand end of the first section is the listening-in or operator's key. Above this there is no signal. Above each line key throughout the remainder of the board is a line signal of suitable type which is actuated by the hook switch at the extension station.

The operation of this board is as follows: On removing a receiver from the hook or taking a hand set from its containing case the corresponding line signal will show, say, No. 10; the operator then throws the lever of the corresponding line key up or down, as the case may be, on one of the five connecting circuits which is not busy and also throws the lever of the operator's key on the same connecting circuit and in the same direction. This puts the operator in connection with the party calling at No. 10 and enables him to find out the party desired. If he desires No. 1 the lever of No. 1 extension line key on the connecting circuit used is thrown in the same direction as the other two, thereby connecting the calling party at No. 10, the operator and the desired line at No. 1. The operator then rings the bell at No. 1 by depressing the lowest lever of the No. 1 line key. When the two parties at No. 10 and No. 1 begin to talk the operator throws his key lever back to normal position. When the key lever of the calling line is thrown the corresponding connecting circuit signals are displayed and the line signal is restored. Also when the conversation is finished and both instruments are hung up, at the substation, the connecting circuit signals will disappear.

In a similar manner all five connecting circuits may be used and five separate conversations carried on at one time; the operator observing the condition of the line called for and of the connecting circuits as to whether busy or not. The five connecting circuits are represented by the five locking positions of the line key levers. Disconnection is made by restoring the levers to normal position.

In connection with the line and connecting circuit signals there is the night bell, which is thrown in or out of circuit by means of a special key. The night bell enables the operator to leave the switchboard and also warns him whenever there is a change in the line or connecting circuit signals. The operation of the board with the bell connected in circuit is the same as that given above, with the following exceptions: When the receiver is removed from the hook at a substation, the corresponding line signal is displayed and the night bell also rings. If this bell is not cut out by the key it will ring until the operator answers the call or until the receiver is replaced on the hook at the calling substation. When the conversation is through and both the instruments are hung up at the substations, the connecting circuit signals disappear and the bell will ring until cut out of circuit. This

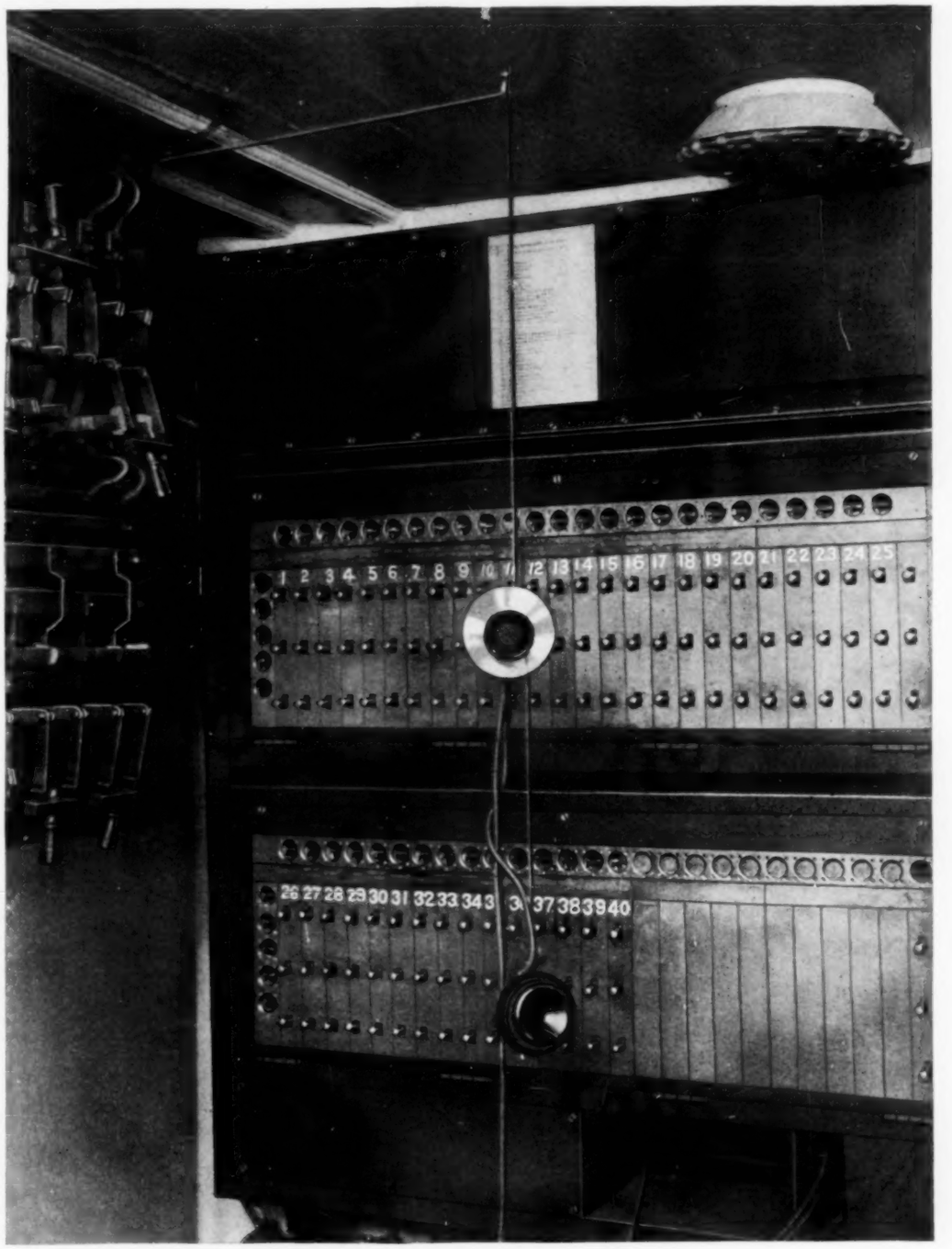


In the Dynamo Room.

calls the operator's attention to the fact that the key levers corresponding to the two lines which have been in use should be returned to their normal positions.

Two types of substation sets are used in connection with this installation, a watertight set and a non-watertight set. The watertight set contains beside the necessary apparatus a hand set consisting of receiver and transmitter mounted so as to be conveniently operated when held in one hand. When not in use this hand set is placed in the metal box, the bottom or transmitter end resting in a cradle and the upper or receiver end held by a spring hook which operates the same as an ordinary receiver switchhook of the central-energy telephone subscriber's set. This box contains all the necessary apparatus of the set and has its direct-current watertight bell mounted on the top. All frame work is of brass and the exposed parts, including the bell, have the standard navy black finish. When closed the lid is held watertight against a rubber gasket in the case by two clamp levers. The connection for the bell and conduit at the bottom are also made in such a way that when the set is closed it is as watertight as possible. These sets are used on all the gun decks and at all places except in the officers' quarters.

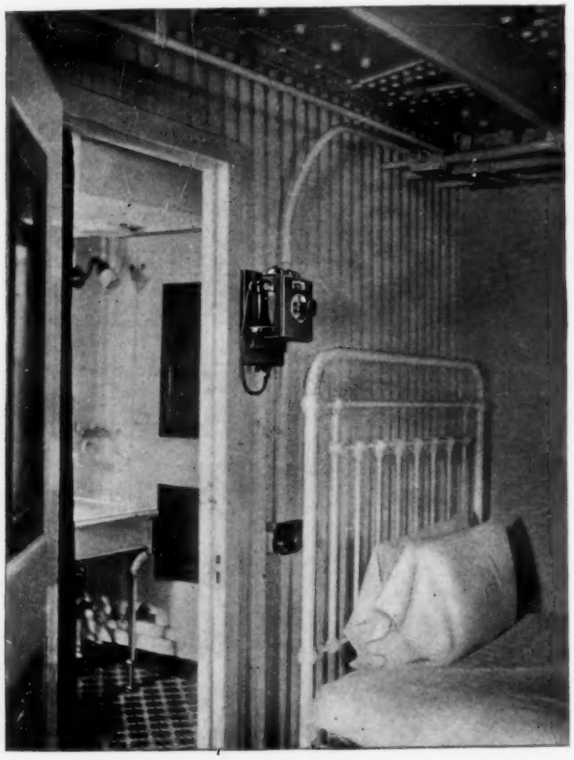
One of the illustrations shows the watertight set installed in the dynamo room. The lid of the containing case is open and the hand set is in place. The lid is so constructed that when open it is held by a hook so that the motion of the ship will not cause it to swing or close while the set is being used. On the inside of the lid is seen a directory which includes the 40 substations, a list of which is given elsewhere. Figure 3 shows a watertight set in the admiral's after cabin. When the ship is stripped for action this compartment forms one of the 3-inch gun stations, and to clean this station and put it in order water is used freely. A waterproof telephone set is, therefore, necessary in such a case.



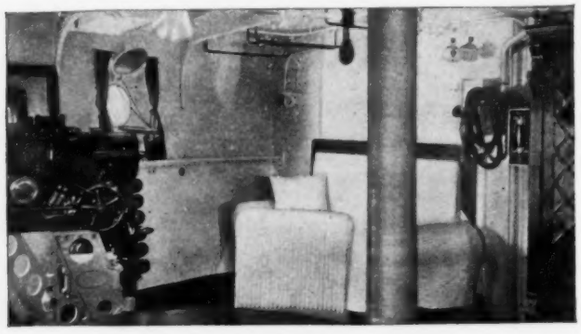
Marine Switchboard on U. S. Battleship Rhode Island.

A similar set is installed on the quarter deck, just in front of the after 12-inch turret. This set is exposed to the weather at all times, yet its operating features are not affected on account of its damp-proof containing case.

The type of set used in the officers' quarters consists of a compact central energy telephone set enclosed in an oak case. A designation plate marks the substation name and also the line number. This set is installed in the admiral's stateroom, and in the dispensary or "sick bay." This telephone station is a very important and essential one and plays a very prominent part in the medical service, not only when engaged in battle, but at all other times.



The Admiral's Cabin and Its Telephone.



The Admiral's After Cabin.

At the central station are duplicates of all instruments for transmitting orders that are installed in the conning tower. The conning tower, which is heavily armored and immediately under the pilot house, is the station into which the commanding officer can retire during battle, and while watching through sight holes can transmit orders to any part of the ship. In case the pilot house and conning tower are destroyed while the ship is engaged in battle the commanding officer and pilot are accommodated in the central station. Here the commanding officer can give all orders to any part of the ship, and here also are provided all necessary means for steering.

The following telephone directory shows the stations connected. It is easily seen that this system administers telephone service to nearly every department on the ship. The list in itself explains the importance of the system. The numbering of the list corresponds to the numbering on the switchboard:

1. Bridge.
2. Admiral's after cabin.
3. Starboard engine room.
4. Wireless operating room.
5. Steering engine room.
6. Dynamo room.
7. Forward 12-inch turret.
8. After 12-inch turret.
9. Starboard 8-inch turret.
10. Port 8-inch turret.
11. Starboard 3-inch guns, frame 62, main deck.
12. Port 3-inch guns, frame 62, main deck.
13. Starboard 6-inch guns, frame 34, gun deck.
14. Port 6-inch guns, frame 34, gun deck.
15. Starboard 6-inch guns, frame 60, gun deck.
16. Port 6-inch guns, frame 60, gun deck.
17. Starboard 6-inch guns, frame 74, gun deck.
18. Port 6-inch guns, frame 74, gun deck.
19. 3-inch guns, admiral's after cabin.
20. Admiral's state room.
21. Captain's cabin.
22. Executive officers' state room, No. 3, used by ordnance officer.
23. Executive officer's office, inside superstructure, used by equipment yeo.
24. Chief of staff's state room, used by the executive officer.
25. Quarter deck.
26. Navigator's state room No. 5.
27. Ordnance officer's state room No. 7.
28. Chart house.
29. Signal tower.
30. Master-at-arms state room.
31. Yeoman's desk, forward store room.
32. Printer's office.
33. Navigator's office, gun deck.
34. Ordnance officer's office, gun deck.
35. Chief engineer's state room, No. 4.
36. Paymaster's state room, No. 6.
37. Paymaster's office, inside superstructure.
38. Surgeon's state room, No. 8.
39. Dispensary.
40. Central station, wall telephone.

The equipment described was installed on the Rhode Island February 17, 1907. Similar apparatus has been installed on the ships New Jersey, Tennessee, Mississippi and Idaho.

A report has been received from an American legation in a Latin-American country stating that a local telephone company has been authorized to construct a local and long-distance telephone system, connecting all important points in the country. Work on this undertaking will be begun at once, and it is hoped to complete the installation of the entire system within two years. Copy of the report containing further particulars about the decree can be obtained by interested firms upon application to the Bureau of Manufactures.

Making a Telephone Directory

By William Doan*

MOST managers give careful attention to their purchase of equipment and supplies. They keep in close touch with the market and have a pretty good idea all the time about how much they should be charged, but when it comes to issuing a directory they leave it all to the printer. True, the manager very frequently requires the printer to quote a price before giving him the order, but that makes little difference, as he has probably quoted on some expensive idea suggested by an uninformed manager. The manager may not know that he has added ten per cent to the cost of his directory and not improved it a bit.

When the printer is first consulted, have him make up a dummy of about the proper number of pages of a suitable stock of paper with a serviceable cover. A great deal of time is lost and unnecessary expense incurred in many cases, by having a directory started in a haphazard way, without proper preparation of copy, or previously deciding on size of book, style of composition, paper, cover, advertisements, etc., etc.

There are a variety of papers used for directories, such as bonds, light manila, tag, S. and S. C. book, laid book, antique book, etc., etc., and as to covers there are a number of kinds, as one seldom sees two directories having the same kind of cover. Few books are handled as often and as roughly as a telephone directory, and consequently they should have a cover that will stand a lot of wear and tear and at the same time be of a color that is not easily soiled, or at least does not show it. So the important thing to bear in mind is to get a cover best adapted for the handling the book will receive.

The paper and cover being selected, next decide on the size of book. The standard size is 6 by 9; some have them larger and some smaller, all a matter of choice. In all exchanges having more than one hundred subscribers, it is advisable to have the directory made up in book form. Be sure to have the book punched and strung. Since you expect the subscribers to keep the book at the telephone, it must be made convenient to hang up.

Special effort should always be made to make the cover of a directory attractive and well balanced. Either a one-color emblem cut, or the two-color cuts in both colors should be used on the front of your directory. It is good policy to have both the name of the company and the place on the outside of cover. It not only advertises the company and the town, but makes a more favorable impression upon the stranger or outsider who by chance picks up one of your directories. Don't have cut-out indexes in your directory unless you have a big one—one hundred pages or more. It costs considerably more and is entirely unnecessary in a small book. A marginal index not cut out answers very well and costs a mere trifle.

Having settled the size and shape of the directory, the size of type and general composition of contents should be determined. For large exchanges, eight-point, or brevier, is the size usually used. Where the list of subscribers is not so large, ten-point or even twelve-point can be used. The larger type makes a page easily read, and an exchange of a few hundred subscribers can produce a directory that compares favorably in size with that of a much larger exchange.

The style of composition is a matter of choice. A page set according to one person's idea would find disfavor in the eyes of another. The most common style of setting the line full, using leaders to fill space between the name, occupation and address, is, however, giving way to that of eliminating the leaders entirely. The advantage of this style is that the eye can at a glance get the entire information wanted, namely, number, name, occupation and residence, without having to follow the leader line so as to pick up at intervals the required information. The subscribers' numbers should be in large boldface figures so as to be easily recognized.

As to display advertising in a directory—our company has never under any circumstances permitted an ad in our directories. Of course, this matter of ads should rest entirely with the company issuing. As to my company, we have confined ourselves strictly to a telephone directory, and not derived any revenue from the by-products which a directory may be made to produce. Some very neat-looking directories are made up with alternate pages of advertising, or with inch ads. running at top and bottom of each page. Trying to display every line of an ad does not give the most pleasing appearance. The sale of advertising space may be made to cover the entire expense of publishing a directory, or if not all, will at least reduce the cost to a mere trifle.

Copy for the printer of a directory is quite difficult to complete. Changes are being made daily—new names added, others taken out, so that copy must be continually revised. The first three or four pages should contain information and suggestions for the patrons, as poor telephone service is more frequently caused by the person using the telephone than otherwise. All copy, especially the list of names, should be typewritten. Such advice may seem unnecessary, yet in some instances from smaller exchanges, copy is supplied in longhand that can hardly be deciphered. This not only makes it more expensive and wastes time in setting up the book and making corrections, but generally produces a directory inaccurate and full of errors overlooked. When advertisements are to be inserted, be sure all the ad copy is ready and sent in at once, with size of ad and position clearly marked. As far as possible, all copy should be sent in at the same time, accompanied by a "dummy," on which is shown the position of each ad the order of the several lists, position of cuts, etc., etc.

It is always more satisfactory to have ads written on the stationery of the firm advertising, or attach a business card or letter heading to the copy. In this way many errors of misspelling a firm name is avoided, as the compositor can only make out a name as the

*Paper read at the Canadian independent convention.

copy appears to him. Never send in a little bunch of copy now and then, or ads as they are collected from the advertiser, and after the book is almost printed, ask that this or that be left out or changes be made in the first run that was made.

The Dark Side of the Telephone

Two well-dressed men walked slowly along the street in a residence district. They were smoking, chatting, and seemed well-to-do men of leisure. Old detectives would have recognized them as Mr. James Briggs alias "the Jimmie Kid," and Mr. William Carter, sometimes called "Climbing Bill," in recognition of his peculiar genius as a porch climber.

It was half past nine in the evening, and these prosperous persons appeared to be on terms of exceeding contentment with the world, without responsibility and without trouble. Yet as they went along they keenly observed the various houses, taking special note of the numbers over the doors. Jimmie, in a low voice, was giving to his partner the names of the different people who lived in those houses, with rough guesses at their financial worth. Jimmie had no Bradstreet, but he carried a wonderfully accurate information as to where they kept their silver.

"Dese folks," he nodded, "gives a party most every night in dis neighborhood, and dey all goes. See dat house over yonder on the corner—dat shindig where all the music is at? Well, most of de folks in dese oder places is over dere."

After they had reconnoitered their ground they left the block and hurried down the street to a drug store. Bill bought half a dozen cigars from the clerk, while Jimmie went into the pay station. Bill came over and stood outside the door, half opening it to listen, half standing guard.

In the palm of his hands he held a carefully prepared list of names, addresses, and telephone numbers of the entire neighborhood.

Jimmie took the receiver from the hook and asked for "Cedar 4-2-6-5." "Dat's de ole banker Blake, got rocks to burn—an' diamonds, gee whiz you oughter to see his wife's diamonds," he explained to Bill. Jimmie waited a moment and the answer came promptly, a man's voice: "This is Cedar 4-2-6-5. Who it is, please?"

Jimmie did not open his mouth. He simply hung up the receiver with a snap. "Dey's at home," he whispered. "De main guy come to de phone hisself."

Then he tried another: "Cedar 3-7-8-2. Dat's Colonel Ware's." This time the answer came so quickly and so distinctly that it startled Jimmie. He dropped the receiver nervously, and then hung it up.

"Dat's one of dem skeery women what's got a desk set right beside her bed. You won't ketch me goin' into no house where dere's a desk set." He chuckled reminiscently. "Went into one wunst—didn't know no better; whilst I was in de next room blessed if dat fool woman didn't call up de whole police force, and de King's Daughters, and de hospital, and de W. C. T. U., and de Salvation Army—had 'em all on top o' me in a few brief minutes—an' me workin' away jes' as innercent as a lamb. Got two years for dat. It made me kinder skittish. No more desk sets for me."

Jimmie waited a little while, then made another trial.

"Main 4-2-2-0." Jimmie listened; presently Bill heard him say in his "society voice" to the operator: "Yes, if you please, ring them again, please. Try again, please. Nobody at home? Thank you." He hung up the receiver.

"Come Bill—dat's de place for us. He's one o' dose swell preachers."

They strolled out of the drug store, hurried down the street and entered the house where they were sure of meeting no interruption. It was a good clean job.

When they climbed the back fence with their swag, Jimmie remarked: "Well, dis'll run us a couple o' years, and dat puts me even on de telephone game."

A Condenser Telephone Receiver

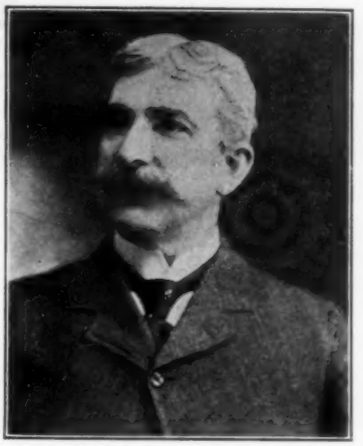
It has been known for some years that paper condensers, when operated with high-tension currents, are set into vibration and emit sounds of considerable strength. A number of attempts have been made to utilize this phenomenon in the construction of a telephone receiver, but in all of them a high-tension battery was necessary for the operation of the receiver. Carl Ort and Joseph Rieger have made experiments with "speaking" condensers and have succeeded in transmitting speech intelligibly with pressures of only four to six volts at the condenser. In the original experiments the condenser was charged by current from a dynamo, and the sound vibrations were transmitted to the condenser by a circuit comprising a microphone, a battery and the primary of a telephone transformer, the secondary of the latter being contained in the dynamo circuit. It was found that the condenser did not speak clearly with a low tension—ten to twenty volts. This led to a special construction of the condenser, namely, a mechanical stretching of the condenser sheets, which made the employment of lower tensions possible. The edges of loose sheets vibrate very irregularly and render the sounds unintelligible, The condenser sheets are clamped in two devices and uniformly stretched by means of screws. In many cases paper may be entirely dispensed with, a coat of shellac on the foil taking its place. In the circuit arrangement each of the condensers is connected to a battery of two to three cells contained in the microphone circuit, so that no special battery is required for the condenser. This arrangement was tested on a line eight kilometres in length with perfectly satisfactory results. In order to make the transmitted sounds louder the condenser is charged to a higher pressure (about twenty volts), and in order to produce sounds that are audible throughout a large room a condenser tension of about 100 volts is necessary, a dynamo being conveniently employed as the source of current in this case. An advantage of this apparatus is that it can be operated under a tension at which the diaphragm does not vibrate its natural period, and this obviously renders the sounds transmitted much clearer and more distinct. The condensers used for ordinary telephonic transmission are four by six centimetres in size and have a capacity of about 0.015 to 0.04 microfarad. It was also observed that the larger the apparatus for a given tension, the louder will be the sounds emitted, since much greater masses are set in vibration. The fact that the currents of the earth's magnetism do not affect the apparatus often makes it more reliable than the electromagnetic receiver.—*Translated and abstracted from Elektrotechnische Zeitschrift.*

Train Dispatching on the Seaboard Air Line

By John M. Stanton

THE Seaboard Air Line has recently completed the installation of a telephone train dispatching circuit between Raleigh and Monroe, North Carolina, a distance of 148 miles. This equipment was cut into service September 4, and has been giving excellent service continuously since that time.

W. F. Williams, superintendent of telegraph of the Seaboard Air Line, whose likeness is reproduced herewith, and who has been an earnest advocate of the telephone since its use was first proposed for train dispatching, has personally superintended the selection and installation of this equipment, and largely to his efforts is due the excellence in construction of the line and installation of the apparatus.



W. F. Williams, Supt. of Telegraph.

The portion of the road selected by the Seaboard officials for the first telephone circuit is located between Raleigh and Monroe, the dispatcher's office being located at Hamlet, 53 miles from Monroe and 95 miles from Raleigh. This portion of the road is single track and carries a heavy traffic, being directly in the main trunk line to the south.

Between Raleigh and Hamlet there are 19 selector stations and two siding telephones. Between Hamlet and Monroe there are 10 selector stations.

The line is constructed of No. 9 B. & S. gauge hard drawn copper wire, 210 pounds per mile. Twenty inch soft copper tie wires are used and all joints are made by means of copper sleeves. The wires are transposed regularly every one-fourth mile. On the section between Hamlet and Monroe the line is carried on a cross-arm, while on the section between Raleigh and Hamlet the line is carried on brackets attached to opposite sides of the pole just beneath the lower crossarm. Where the line is carried on crossarms the transpositions are made by means of Peirce drop brackets, the idea being that in case of a broken insulator there will always be the crossarm between the two wires. Where the line is carried on brackets the transposition is accomplished by raising the brackets on one side and lowering them on the other for a distance of two poles, which provides ample clearance for the transposition.

The telephone and terminal apparatus was furnished by the Western Electric Company, its new high efficiency transmission circuit arrangement being used throughout. The signaling is done by means of Gill main line bridging selectors.

Fig. 1. Dispatcher and Equipment at Hamlet.

The dispatcher's telephone equipment consists of three sets of head receivers and breast transmitters with cord and plug attached, one set for the use of each trick dispatcher. Fig. 1 illustrates the method of using these sets. This is a photograph taken of one of the dispatchers and the desk equipment at Hamlet. The sending cabinet, it will be noted is equipped with Gill individual call keys, one for each way station. A pair of jacks is mounted in the front rail of the desk into which the plug connected to the dispatcher's telephone set is inserted.

A key is provided for closing the dispatcher's transmitter battery circuit and is so arranged that the circuit may be held closed while talking only, or locked closed, as desired. Portable storage batteries of four volts and 60 ampere hour capacity are used for the dispatcher's transmitter battery. There are two sets of these, one being in service while the other is being charged.

The chief dispatcher's desk is provided with a standard desk stand telephone, which, however, has associated apparatus designed specially to give good transmitting and receiving and still not interfere in any way with the sending or receiving of the regular dispatcher.

The necessary retardation coils and condensers are provided to absorb the noise produced when sending signals to the way station selectors. This is necessary in order that transmission and signaling can be carried on simultaneously.

A repeating coil is introduced into the line at the dispatcher's office, which separates the line into two portions. This arrangement allows signaling on either end independent of the other and results in a considerable saving of sending battery. The two ends of the line terminate at the dispatcher's office, on O'Connell lightning arresters, being brought into the office with No. 12 twisted pair B. R. C. wire independent of all cable. Switches are provided just inside of the protectors so that all of the station apparatus can be cut off from the line if desired. Fig. 3 shows the method of mounting the terminal apparatus referred to above.

At the way stations the telephone equipment consists of the "Flexiphone" transmitter arm, equipped with a special switch hook for use with the leather head band receiver as shown in Fig. 2, together with its associated induction coil, condenser, etc. A small push button key is provided, which, in its normal position, maintains the

circuit for listening. When the operator desires to talk, the push button key is operated. This key is a feature of the high efficiency circuit referred to above. Its use is necessary in order to give the best possible transmitting and receiving, especially under the condition where there are a large number of stations which may have receivers in circuit simultaneously demanding abnormal current.

Fig. 2. "Flexiphone" Arm and Head Receiver.

The Gill selectors at the way stations, as stated above, are of the main line bridging type, and are wound to 4500 ohms. These selectors are bridged directly across the line. A variable resistance is furnished which is placed in series with the selector winding. This resistance is of a high value near the dispatcher's station, gradually decreasing at successive stations, so that the last station on the line has no resistance. This resistance is used to compensate for the line resistance and line drop in potential, the result being that all selectors receive the same quantity of current, about 8 milliamperes.

On each side of the selector and in series with it are two small retardation coils to protect the selector windings from injury by lightning. The "answerback" is produced inductively between the line winding and a low winding in series with the bell and selector contact.

The method of bringing in the leads at the way stations is similar to that at the dispatcher's station, O'Connell protectors being used in all cases. No fuses are used in protecting the line or apparatus, inasmuch as the line is not liable to cross with any high tension circuit.

At two blind sidings between Raleigh and Hamlet are located wall telephones in weatherproof boxes attached to telegraph poles. These boxes are covered with galvanized sheet iron and have a line switch so arranged that the switch must be opened before the door can be closed. These sets are equipped with the high efficiency transmission circuit and apparatus similar to that at the way stations. No ringers are provided as it will not be necessary to ring these stations, and hand generators are omitted since the dispatcher is on the line at all times.

Two portable telephones are furnished for use on wreck cars. These telephones have a hand set, with the necessary associated apparatus for talking and listening, and also a ringer, for use in case the dispatcher wishes to call the wreck car while the set is in service. An 18-foot line pole is furnished with each portable set, this being in three sections of six feet each. One hundred feet of flexible conductor is provided with each pole.

At intervals of about 25 miles, a set of test switches are installed, these being located at Wadesboro, Sanford and Aberdeen. There are three switches, one of which opens the circuit to the station apparatus, the others open the line either way, leaving the station apparatus connected to the end of the line not opened. No provision is made for grounding, or short circuiting, as it is not thought that these operations will be much used when testing.

The movement of trains on this section of the road operated by the telephone circuit is assisted by the use of a telephone block system. Between Monroe and Hamlet with ten intervening stations there is in service a special composite block system. This was designed by the Western Electric Company is a modification of its railway composite telephone. It is used on a local telegraph wire and both telegraph and telephone may be used simultaneously.

Between Hamlet and Norlina, 154 miles, is a magneto telephone block system of 36 stations operating on a grounded block wire.

As stated above, the dispatching telephone circuit has been in operation since September 4. The business of the road on this division has been handled during that time in a manner very satisfactory to the officials of the company.

The dispatchers and operators have adapted themselves very readily to the new method and find that they can handle the work with greater ease and dispatch than by the telegraph. Mr. H. W. Purvis, the chief dispatcher at Hamlet, states that he is very well satisfied with the new arrangement, and that his dispatchers are finding the telephone method a great improvement.

One of the prominent officials of the road, when asked for his opinion of the telephone, judging from its operation so far, replied that he would like to see every mile of the Seaboard Air Line equipped at once.

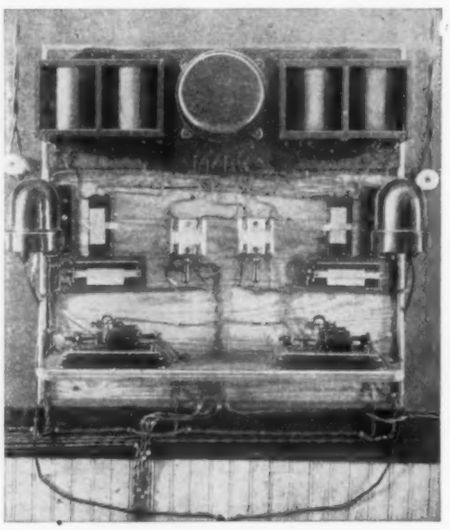


Fig. 3. Terminal Apparatus.

The idea that telephone train dispatching is not so safe as the use of the telegraph for the same purpose, which had a few adherents in the early days of the work, is now almost entirely dissipated. With the practice of repeating each order back to the sender for checking, errors are practically impossible; and as a written copy is made of every order, there is no shifting of responsibility. Telegraph operators who felt that their profession was jeopardized by the innovation have attacked it on these grounds. The fact is, many railroads have declared their intention of keeping these operators to use the telephone, because of their valuable experience in railroading.

Inductive Disturbances on Telephone Lines

By J. B. Taylor*

IN THE early days of the electrical industry the telegraph practically had the field to itself. The telephone and electric light were introduced at about the same time, and later on the alternating-current systems gradually came into general use for lighting, general power and railway purposes. At the outset, the telegraph systems made use of earth return and continue to do so at the present day. The telephone systems started out using an earth return, but soon found that satisfactory service, except in isolated cases, could be obtained only with metallic circuits. The power systems (this term includes alternating-current systems whether used for lighting, for power or for railway purposes) have until recently almost invariably used metallic circuits, which, when properly installed and under normal conditions, cause little interference to telegraph and telephone lines. Abnormal conditions, however, such as grounds, open circuits, and the like, upset the normal balance, giving strong external fields, both electrostatic and electromagnetic, which are likely to make trouble for sensitive systems in the immediate neighborhood. Recently the single-phase railway system has come into prominence. With this system the conditions are continuously very similar to those conditions which exist occasionally but of short duration on the power systems.

The great increase in the transmission industry means that power circuits are continually becoming longer, voltages higher, and the amount of energy transmitted greater, with more or less corresponding increase in disturbance to the weaker brothers. Steam railroads have in many cases presented the most natural and logical right of way for pole lines with the result that power wires and signaling lines are likely to be in proximity.

The whole science of having a perfectly quiet telephone line is dependent on the Wheatstone bridge principle, that no current will flow in the wire or instrument connecting two points at the same potential, even though these two points are on conductors carrying currents of considerable magnitude. The practical application of this principle requires that each wire of a telephone circuit shall have the same resistance, the same inductance, the same capacity, and the same insulation resistance; and more exactly, that these con-

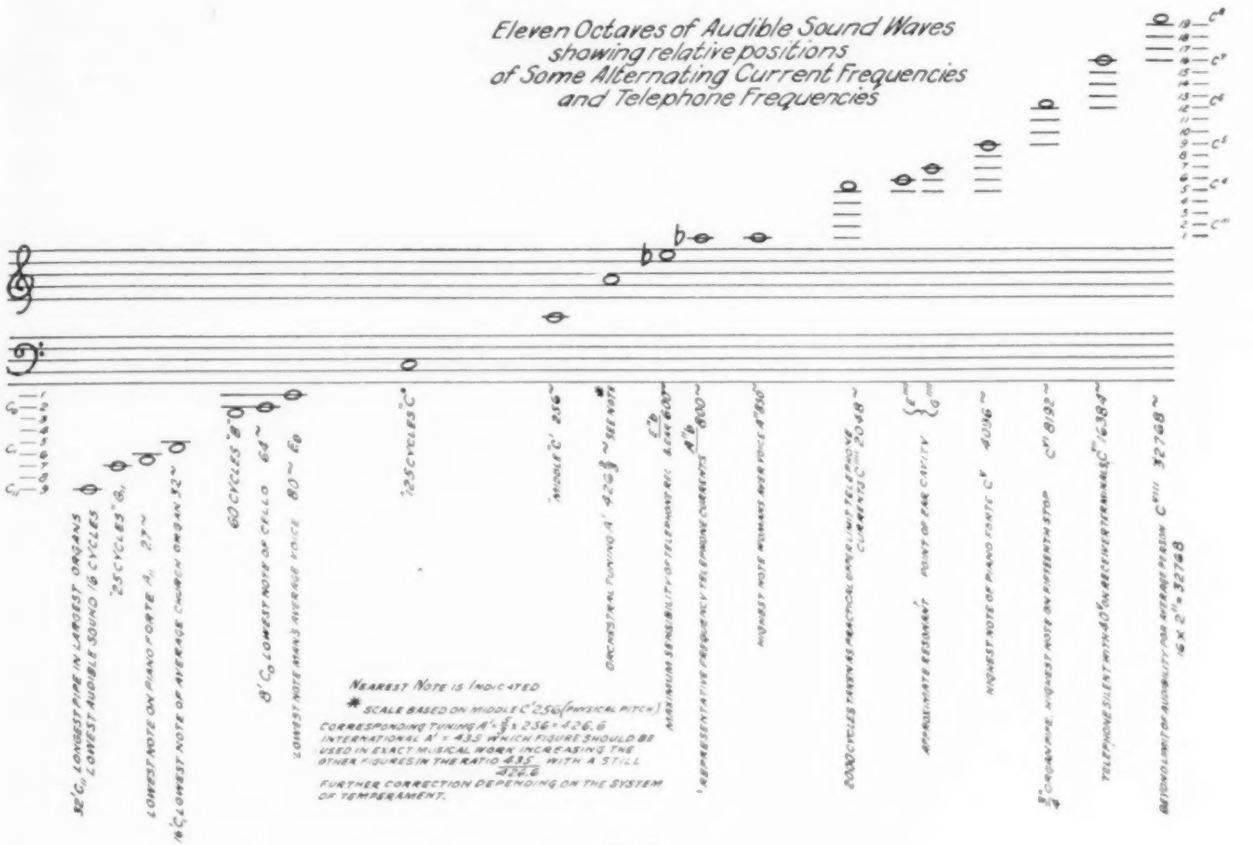

Eleven Octaves of Audible Sound Waves
showing relative positions
of Some Alternating Current Frequencies
and Telephone Frequencies
NEAREST NOTE IS INDICATED
* SCALE BASED ON MIDDLE C' 256 (PHYSICAL PITCH)
CORRESPONDING TUNING A' = 256 x 426.6 / 435
INTERNATIONAL A' = 435 WHICH FIGURE SHOULD BE
USED IN EXACT MUSICAL WORK INCREASING THE
OTHER FIGURES IN THE RATIO 435 / 426.6 WITH A STILL
FURTHER CORRECTION DEPENDING ON THE SYSTEM
OF TEMPERAMENT.

Fig. 1.

*Abstract of a paper read before the A. I. E. E., October 6, 1909.

ditions of equality shall hold, not only for the circuit as a whole, but for each and every short section of the circuit. Still more exactly these conditions of equality must hold for the entire range of frequency to which the apparatus is sensitive and for currents of any magnitude that are likely to be introduced into the circuit.

In practice these ideal conditions can be attained only approximately, even after making numerous

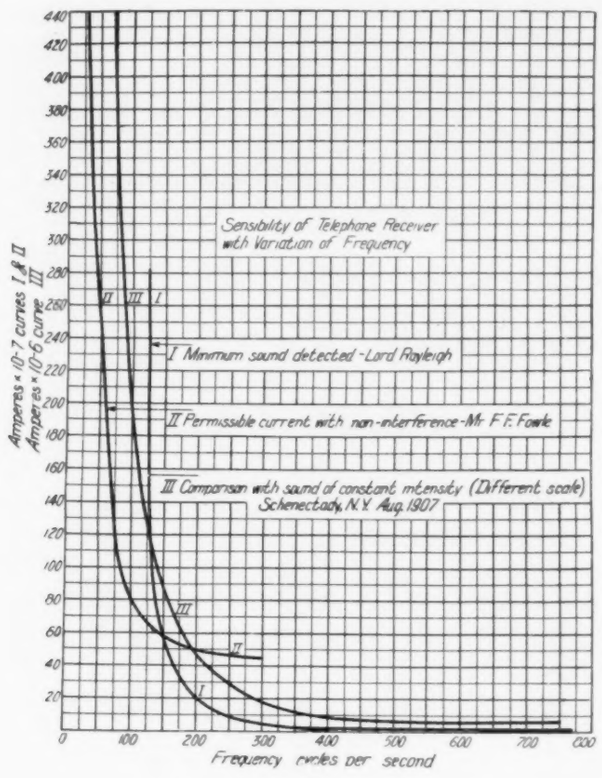

Sensibility of Telephone Receiver with Variation of Frequency
Amperes × 10-7 curves I & II
Amperes × 10-6 curve III
I Minimum sound detected - Lord Rayleigh
II Permissible current with non-interference - Mr. F. F. Fowle
III Comparison with sound of constant intensity (Different scale) Schenectady, N.Y. Aug. 1907
Frequency cycles per second

Fig. 2.

transpositions of the two conductors. An Institute paper by Mr. F. F. Fowle,* dealing with the question of transpositions, and the practice of making these transpositions sections 0.5 mile long in order to reduce to a negligible amount the cross-talk from neighboring telephone circuits, shows the extreme sensibility of the telephone receiver.

The actual magnitude of currents in telephone lines, resulting from speech sent into the transmitter, cannot be given with any accuracy. The strength of the battery, the special characteristics of the transmitter, the ratio of transformation in the induction coils, the constants of the line, not to mention the intensity of the voice, and the manner in which it is directed into the transmitter—all these are factors affecting the value of this current. For the purpose of this discussion, however, we may assume that on short lines the current may be as high as two or three milliamperes, while at the receiving end of long lines the current may be less than the one hundredth part of this and still be sufficient for the proper understanding of conversation.

The frequency of speech currents (for commercial telephone quality) is probably included between 200 and 2,000 cycles. Probably the most important of these currents lie between 700 and 900 cycles. The writer believes it has been for some years the practice of the telephone companies to consider 800 cycles as the one frequency best representing the general range and to make use of this frequency from small alternating-current generators when making quantitative measurements on different pieces of apparatus. How this figure was originally arrived at, the writer has not been informed, but observations of telephone speech currents, which he has carried on by the aid of the oscillograph, tend to show that, roughly, 700 cycles is the prominent frequency in a man's voice. It is somewhat higher, say 900 cycles, in a woman's voice.

Fig. 1 shows a musical scale on which are noted the various frequencies referred to in this dissertation, and other frequencies that may serve to give a clearer idea of the various tones referred to.

To state the number of years of continuous sound that could be produced by one kilowatt-hour will serve no useful purpose in this paper; but of more practical interest are the curves of sensibility to different frequencies as given by Lord Rayleigh* and by Mr. Fowle† in the paper previously referred to, and by the writer's recent experiments. These curves, Fig. 2, were all made on a different basis of comparison, which accounts for the large differences in actual magnitudes of current; but attention is particularly called to the fact that, comparatively speaking, the sensibility at, say, 25 cycles, as shown by all of these curves, is not even of the same order of magnitude as the sensibility at, say, 600 cycles.

These curves are combined physical and physiological effects, as no attempt has been made to separate the influence of natural period of the telephone diaphragm. The size and weight of diaphragms in use seem to have been derived empirically and the small difference among so many makes is worthy of note.

Physiological phenomena having more or less bearing on this question of telephone sensibility are briefly stated below.

A. The lower limit of audibility is given by Helmholtz‡ as 25 to 30 cycles. Later investigation by

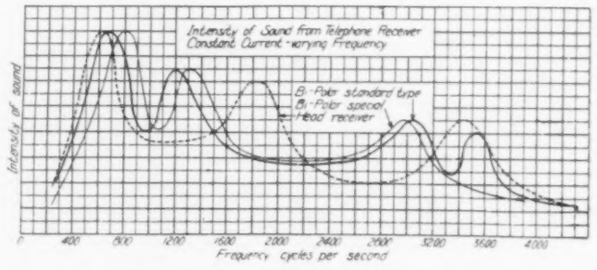


Fig. 3.

Messrs. Preyer and Ellis** place 15 cycles as the extreme low limit. Tests of this sort depend almost entirely on the intensity of the sound, and there is great danger in confusing some of the harmonics with the fundamental. The writer believes that he has

*"The Transposition of Electrical Conductors," Trans. A. I. E. E., Vol. XXII, p. 659.

*"Theory of Sound," Vol. I, p. 473.
†"The Transposition of Electrical Conductors," Trans. A. I. E. E., Vol. XXII, p. 659.
‡"Sensations of Tone," Helmholtz, p. 116.
**"Sensations of Tone," Translator note, p. 116.

actually heard a 25-cycle tone from a telephone receiver, but this could be heard only after taking precautions to obtain a smooth wave shape, by passing a comparatively large current through the receiver, and by holding the receiver very tightly against the ear, in a soundproof booth. The vibration of the diaphragm at 25 cycles could be plainly felt by touching with the finger at a current value much below that required for an audible sound.

B. The upper limit of audibility, while apparently more definite, varies with different observers, 30,000 cycles being the figure ordinarily assigned for the upper limit, although some persons may hear sounds as acute as those corresponding to 40,000 cycles. The telephone receiver is not well adapted to respond to these very high frequencies, and a rough test made by the writer indicated that the sound was practically lost at 12,000 cycles, even though there was a pressure of 30 to 40 volts directly on the receiver terminals. When making this experiment it was noticed that as the high-frequency generator accelerated or came to rest there were certain frequencies which gave marked increase in sound. While investigation of this point has been by no means complete, the accompanying rough curve, Fig. 3, is given as a matter of interest. While on this matter, it should be noted that for musical purposes sounds higher than 4,000 cycles are considered of little or no value.

C. Low tones tend to drown out or diminish the apparent intensity of higher tones.* The ear apparently fixes its attention on the lower tone. This point is well recognized by musicians who rate a complex tone according to its lowest partial, even though the magnitude of this partial is small compared to that of some of the higher harmonics.

D. The ear itself, containing a column of air, should have its own natural period; this period Helmholtz places† in the neighborhood of e"" to g"", roughly, 2,600 to 3,200 cycles. Consequently the ear is especially sensitive to sounds corresponding to its own period.

E. Continuous sounding of a tone tends to deaden the ear to appreciate this particular tone.‡ Consequently, there is less difficulty in talking over a noisy telephone line where the noise is of constant pitch and intensity, as compared with the difficulty of talking over a line, where the noise is continually varying in pitch, intensity and quality.

On any telephone system eternal vigilance is the price of first-class service. The insulation always has a tendency to become worse, and change in resistance at connections will upset the balance. So long as the telephone line has the field to itself, the closest attention need not be paid to these points. However, when in the neighborhood of other conductors, departure from a theoretically perfect balance immediately begins to be felt, and much more attention must be paid to transpositions and insulation. While the writer states nothing new, he wishes here to emphasize the importance of bringing the insulation of the telephone system as a whole into first-class shape before wasting any time or money on transpositions. In many cases, on a telephone line becoming unsatisfactory, it is the practice to cut in more transpositions. If these have previously been located at every tenth pole, they may be doubled up, placing one at every fifth pole. Probably there are few telephone lines, on the same poles with power lines, where transpositions at every fifth pole are any more effective than at every tenth pole. While with some forms of transposition there is no objection to placing as many as the line will hold, those forms which involve cutting the wires and making splices are likely to have imperfect joints, with consequent loss of balance. In general, the more transpositions the more likelihood of high-resistance joints. We have also seen a fantastic arrangement of see-sawing the two conductors of the telephone line up and down from pole to pole in the vain hope that a noisy line would be quieted in this manner.

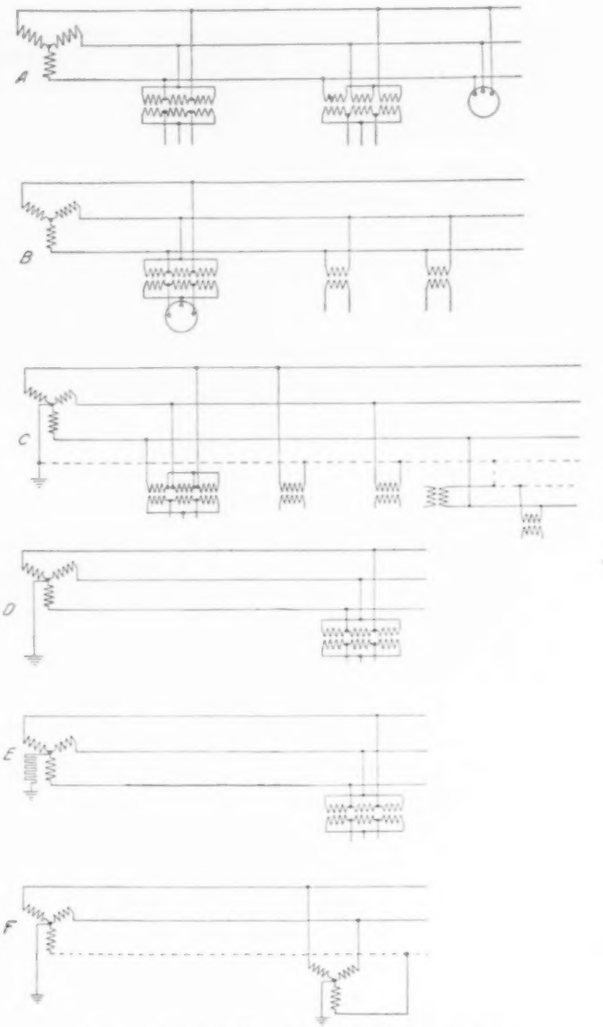


Fig. 4. Typical ThreePhase Distributing Systems.

In a recent instance, additional transpositions were placed in a telephone line, and also in the power line, with small improvement in service. The trouble was eventually found in some transmitter dry batteries, which were located away from the instrument in a damp location. It is the habit of telephone manufacturers to make common connections between the primary and secondary circuits of their instruments in

*"Theory of Sound," Lord Rayleigh, Vol. II, p. 444.
†"Sensations of Tone," p. 116.
‡"Theory of Sound," Lord Rayleigh, Vol. II, p. 446.

the endeavor to save, either a few inches of wire, or an extra contact at the hook switch. This means that unless attention is paid to every inch of the telephone system, it is poor economy to replace the cheap pony glass on the outside line by high-grade porcelain.

Alternating-current systems.—The earliest alternating- current systems were operated single phase and used mainly for lighting purposes, from a large number of small transformers. Being a metallic bridging system free from grounds, the fields which may cause disturbance to neighboring wires are comparatively weak. Since these lighting systems usually supply the

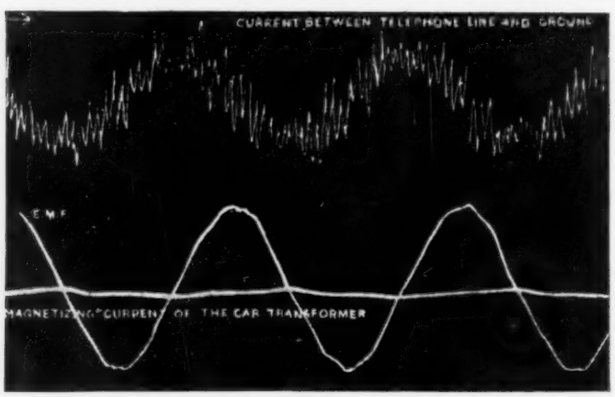


Fig. 5A.

same customers that are also supplied with telephone service, local telephone lines are especially likely to be in proximity to such circuits. The further objections of property owners to tree-trimming, and to duplicate pole lines in residence sections, usually result in occasional grounds on the lighting circuit, or the telephone circuit, or both, with attending noisy lines. Since the various feeders in the local distribution are connected in parallel to the same bus-bar, a ground on any one feeder upsets the electrostatic balance of all the others. It is also possible on such a system to have a ground simultaneously on both sides of the circuit, which may result in unbalanced currents and electromagnetic inductive effects; but on account of the usually high resistance of tree grounds, etc., such currents are likely to be small and of slight disturbance compared with the unbalanced electrostatic effect.

An ideal metallic circuit telephone system should not be affected by exposure to fields of any strength, but the great differences between ideal and practical construction are such that not infrequently a heavy ground on a 2,300-volt local lighting system will be felt on all of the telephone lines in the exchange.

Another local alternating-current system is that used for series arc lighting. These circuits usually carry 6.6 amperes, and with 50 lamps in the circuit the potential between wires is approximately 4,000 volts. This potential is reduced by 80 volts as each lamp is passed in succession. More inductive disturbances have been felt from circuits of this character than from the typical lighting circuits discussed above, mainly in instances where the lamps have been connected to the wires with little regard to preserving the balance. For example, all the lamps may be connected in one side of the circuit, the other side serving merely as a return. In such a case that point of the system at earth potential would be somewhere near the center of the lamp system, instead of at the end of the line. In other cases the two sides of the circuit are not kept together, in the attempt to save wire by looping down one street and up another. A side-branch cut in tends to give a similar unbalanced electrostatic potential, although this arrangement is in general not so bad as where all the lamps are cut into the same side of the circuit. In addition to the greater inductive disturbances from unsymmetrical placing of lamps and looping of circuits, these arc circuits are more likely to be grounded than the multiple lighting circuit, partly on account of the higher voltage.

The next system to be considered is the three-phase system represented in typical diagrams of Fig. 4. *A* represents the simple three-phase system supplying three-phase load, either through banks of transformers or directly. With this system the very nearly equal capacity between each of the wires and ground tends to maintain the neutral point of the system at earth potential as indicated by *e*. At any given instant the algebraic sum of the potentials of the three wires (measured to earth) is equal to zero, and the algebraic sum of the currents in the three wires at any location on the system, is also equal to zero. Consequently, unless the three wires are widely separated, the external fields, both electrostatic and electromagnetic, are weak. An accidental ground on any one of the three conductors disturbs the electrostatic balance, with results similar to a ground in the single-phase system previously considered.

B shows a three-phase system used for both power and lighting. As indicated in this diagram, it is not unusual to extend any two of the conductors to make

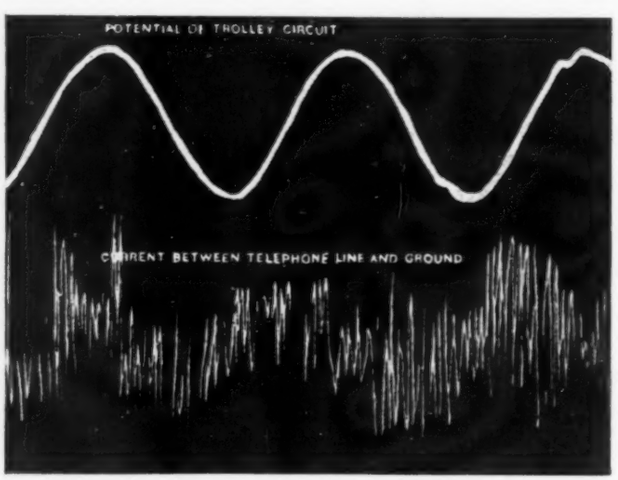


Fig. 5B.

a single-phase distributing line. This arrangement, even with perfect insulation of the system, displaces the neutral point from earth potential, as indicated by *e*, a greater or less amount depending on the relative capacities of the three-phase branches and single-phase branches. From such a mixed system we might, therefore, expect electrostatic induction. Electromagnetically, however, this system is as well balanced as the preceding. A similar condition may arise on a balanced system of distribution through the blowing of a fuse.

C shows a four-wire, three-phase system as occasionally used for combined lighting and power distribution. In this case a fourth conductor is connected to the neutral,

which may or may not be grounded. Motors and three-phase transformer banks may be connected as in the simple three-phase system while lighting transformers are connected between any one of three conductors and neutral conductor. This system is on a par with *B*, when the neutral point is not grounded. When the neutral point is grounded, a single-phase branch as indicated between *d* and *e*, will obviously have the same effect as a single-phase line with one conductor grounded.

D shows a three-phase system with the neutral point definitely maintained at earth potential. Neglecting line drop and regulation of the system, a ground on any one conductor does not disturb the electrostatic balance but does upset the electromagnetic balance as in this case the current, determined by the resistance of the fault and the earth return, flows over one wire and returns to the neutral through the earth.

E shows the neutral point grounded through a resistance. With this arrangement, a ground on one conductor will usually disturb both the electrostatic and electromagnetic balance. The relative disturbance of each sort depends on the resistance of the fault and neutral resistance.

F shows a three-phase system on which the neutral point is grounded at both the generating and receiving ends of the line. From the standpoint of disturbance, this is very similar to D. From the operating standpoint, the grounded neutral at both ends permits continued operation in emergency with either one or two of the wires out of service. When running on two wires, the electrostatic disturbance will depend on whether the third wire is alive without carrying current, or whether it is dead through being disconnected at both ends. Any operating condition which causes currents to flow from one neutral to the other through the earth, will also unbalance the circuit to some extent. In all of this discussion it has been assumed that the electrostatic capacity to ground of the generator and transformer windings is small compared with the capacity of the distributing wires whether in underground cables or overhead lines.

The practice of transposing three-phase lines varies between no transpositions at all to transpositions every mile. For the average system, transpositions are of no value unless the telephone or telegraph wires are near enough to be affected. Too many transpositions, besides being of little service, tend to weaken the line and increase the difficulties in locating trouble.

Harmonics and irregularities. When the electromotive force wave of a generator, as measured between the neutral and one of the terminals, contains third harmonics, and other harmonics which are multiples of the third, these harmonics are in the same phase relation in the three windings. Grounding the neutral point brings the potential wave of these particular harmonics on all three of the line wires in the same phase relation. Electrostatically considered, therefore, with reference to the third harmonic the three wires may be regarded as a single wire whose potential to ground varies at triple, and multiples of the triple, frequency. The possible resulting disturbance will depend entirely on the magnitude of these harmonics. The writer knows of but one case where trouble was experienced with telephone lines as the result of grounding the neutral point of generators, and in this case there was nothing to show whether or not the telephone line was in fair condition for exposure to the high-tension transmission line. In several tests made it has been impossible to tell, from the telephone line, whether the neutral connection was grounded or not. In one instance an ordinary telephone receiver was connected between ground and the neutral of a 2,000-kw. 13,200-volt generator, in service and feeding, through several thousand feet of cable and six or seven miles of transmission line, a 1,500 kw. synchronous converter. The noise was no greater than is occasionally heard on a commercial telephone line in trouble. This somewhat dangerous experiment was performed only after finding that the triple-frequency charging current on this system was too small to be measured on commercial aternating-current instruments.

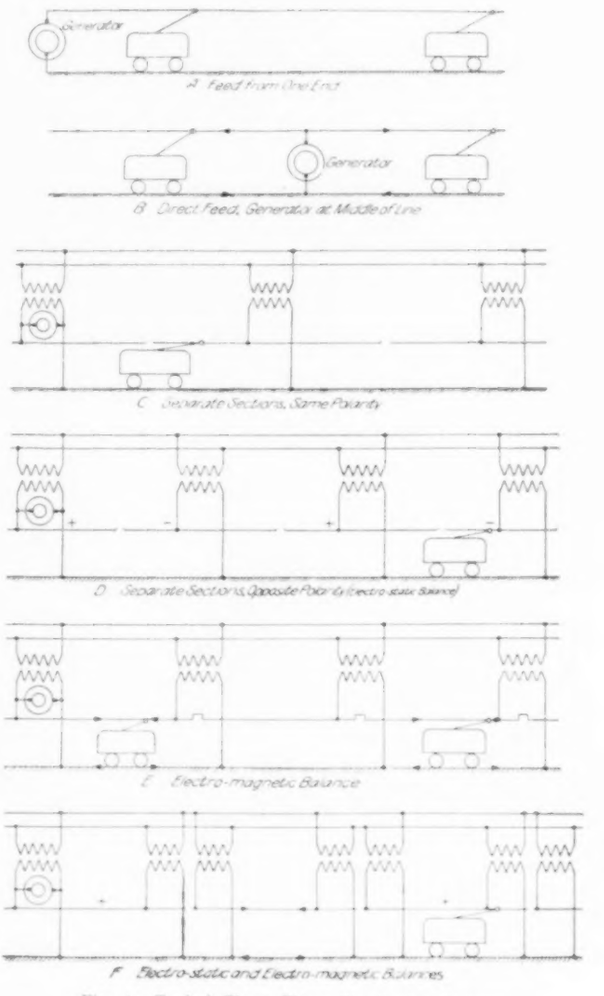

Generator
A Feed from One End
Generator
B Direct Feed, Generator at Middle of Line
C Separate Sections, Same Polarity
D Separate Sections, Opposite Polarity (Electro-static Balance)
E Electro-magnetic Balance
F Electro-static and Electro-magnetic Balances

Fig. 4. Typical Three Phase Distributing Systems.

Variable permeability and the hysteresis and eddy-current losses in transformers result in a distorted wave of exciting current. This distorted current-wave can be resolved into third harmonic components which may, for certain combinations of transformer connections, result in third harmonic potentials between three wires (regarded as one) and ground. For other connections, triple frequency currents may circulate through a circuit made up of transmission wires and ground.

The symmetrical construction of field poles and winding of alternating-current generators causes positive and negative waves to be of the same shape, and hence

free from evenly numbered harmonics.* These even harmonics, nevertheless, may be introduced into a power system if transformers or other pieces of apparatus contain iron which is permanently magnetized. Ordinarily, transformers are free from permanent magnetism, but in circuits involving earth return there may be a considerable direct current passing through the winding, derived from neighboring direct-current trolley systems, etc. The general tendency in such cases is for the waves to be peaked and flat topped in succession.

Even where the generated electromotive force wave is comparatively free from harmonics, the various pieces of apparatus on the system will all have their effect on the potential wave. An instructive experiment in this line is to connect a telephone receiver in series with a small condenser, to alternating-current house-lighting mains. The number of strange noises heard in such a case, due mainly to induction motors on the system, will be a surprise to any one who has not tried this simple experiment.

Oscillograms Fig. 5 show the charging current between telephone line and ground, the same being in proximity to a single-phase trolley wire. Curve *a* is the charging current between the telephone line and ground with cars at standstill, and Curve *b* with cars in operation.

On account of the much greater sensibility of the telephone receiver to sounds of high frequency, these irregularities in the potential wave, although of much smaller magnitude than the fundamental frequency, are much more likely to be heard in neighboring telephone lines, when transpositions and other points of balance have not been given close attention. A condenser connected between alternating-current wires and earth, will, to a certain extent, absorb these high-frequency irregularities.

It should also be noted that the various neutralizing connections later discussed, as well as neutralizing for the fundamental frequency will, to some extent neutralize also for higher frequencies.

Single-phase railway. The several typical diagrams of Fig. 6 show the transformation and distribution arrangements for the latest addition to the alternating-current field—the single-phase railway.

Diagram A shows the single-phase system in its simplest form. One terminal of a single-phase generator is connected to earth and the other to an overhead trolley conductor. The return circuit is made up of steel rails and earth. Neglecting line drop, the overhead conductor is at the same potential throughout and there being no neighboring conductor of opposite polarity, there will result electrostatic fields of constant strength irrespective of number of cars in operation. From the standpoint of inductive disturbances, this is the worst arrangement that can be made with the single-phase railway system. Electromagnetic effects will be proportional to the length of transmission and to current, and vary with load and distribution of cars.

Diagram B is just as bad electrostatically, but by locating the generating station at the middle of the line, instead of at the end, the maximum length of feed is reduced to one-half, and, depending on the running schedule of the cars, there may be a still further reduction in magnetic inductive effects through more or less neutralizing action from currents in opposite directions, to supply cars each side of the generating station.

*See "Even Harmonics in Alternating Current Circuits," Proceedings A. I. E. E., July, 1909, pp. 963–970.

Diagram C is an extension of B through the addition of transmission line and transformer sub-stations. Again considered from an inductive standpoint, this is better than B only through the feasibility of reducing the length of the individual sections. Diagram D is essentially the same as C except that transformer connections have been so made that alternate sections are of opposite polarity. Consequently, the equal exposure of a telephone or telegraph line to the same number of positive and negative sections will practically neutralize the effects of electrostatic induction. In this connection it should be noted that there will be charging currents flowing back and forth in a neighboring telegraph wire from the portion opposite the section of single-phase trolley of one polarity, to the neighboring section of opposite polarity. If there be intermediate stations on the telegraph line, these charging currents, flowing from one section of the wire to the other, may be sufficient to disturb the relay. From a railroad point of view, a section of trolley wire fed from a single sub-station is liable to tie up the whole road if a single sub-station goes out of commission. The circuit arrangement next to be considered obviates this difficulty by the use of trolley section continuous between sub-stations, thus giving duplicate feed.

Diagram E shows a typical arrangement of a single-phase trolley wire continuous between transformer sub-stations. In this arrangement all trolley sections are of the same polarity with corresponding electrostatic effects. From the standpoint of electromagnetic induction, however, this system of distributing has marked advantages. Assuming equal transformer potential at two adjacent sub-stations, a car midway between stations will draw equal current from the two sub-stations. These equal currents flow equal distances but in opposite directions, with a consequent neutralization of the electromotive force induced in neighboring telegraph or telephone wires. This neutralization also holds for positions of the car when other than at the half-way point, for while greater current will flow from the nearer sub-station, this greater current flows through a shorter length of trolley wire than does the lesser current from the farther sub-station.

The next step is to combine the two arrangements as shown in diagram F, where trolley sections are fed from both ends, and alternate sections are of opposite polarity. This arrangement requires either two transformers at some of the sub-stations, or, what amounts to the same thing, a transformer with two secondary windings.

(To be concluded.)

Absent Treatment by Telephone

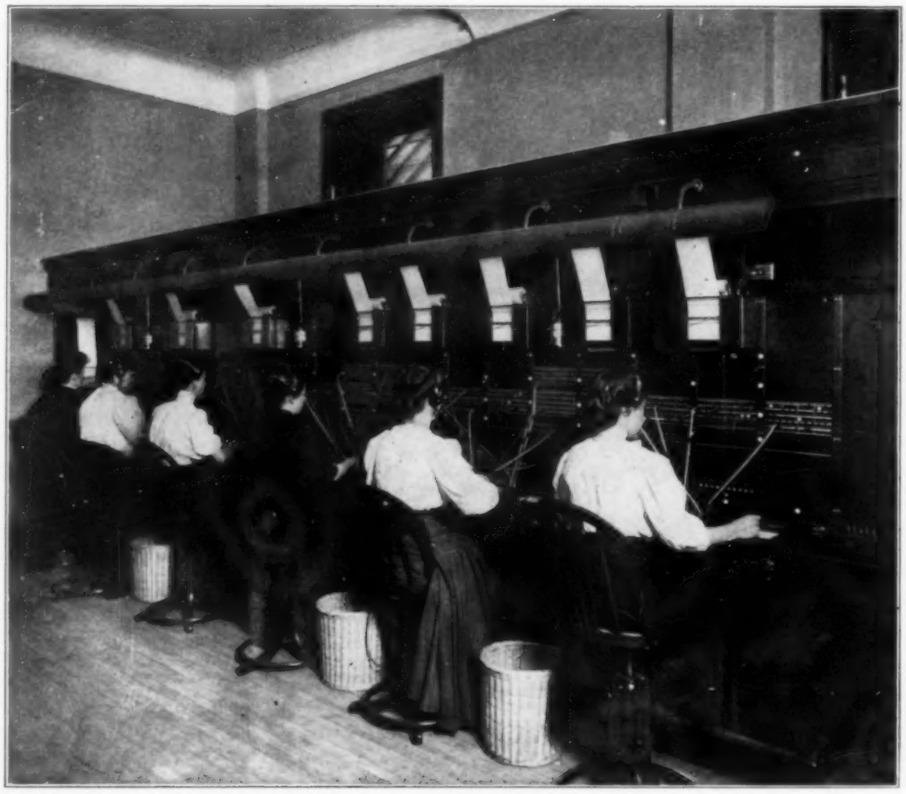
Christian Science absent treatment over the telephone is assuming such large proportions in Los Angles, Cal., as to increase very materially the business of both of the telephone companies there, and sometimes to conflict seriously with traffic over long-distance lines. It is stated that healers in Los Angeles and Pasadena give treatment by wire to patients in Riverside, Santa Barbara, San Bernardino and all over southern California. At first operators were nonplused in cases where the patient called up a healer and held the connection in absolute silence while the long-distance treatment was proceeding over the wires; hearing no sound the operators would cut in, and getting no response they pulled the plugs, thus leading to complaint as to the service.

A Telephone-Telautograph Installation

By O. N. Livermore

THE telephone system of a big commercial hotel sees a great deal of service, and hotel managers are often the first to adopt such telephone improvements and refinements as invention brings forth from time to time. Competition in the hotel business is certainly as great as in anything else, and the little details of convenience and efficient service often form the points upon which turns the decision of the patron.

Chicago's big new hotel, the Blackstone, now in process of completion on the lake front, is destined to be second to none in the excellence of its appointments. It is the intention of its management to leave nothing undone that will add to the comfort and satisfaction of its guests.



Switchboard of the Type to Be Installed in the Blackstone Hotel, Chicago.

Although a telephone in every room seems almost the utmost limit in the direction of intercommunication, and would have been an undreamed of luxury a comparatively few years ago, the Blackstone management has gone still farther.

The general scheme of the system includes telephones in every room by means of which guests make known any and all of their wants to the telephone switchboard operator, who in turn is provided with telautograph equipment enabling her to immediately connect with and write to the proper department for information or execution of the request according to its nature. In this way a great deal of the business of the hotel is centralized at the telephone switchboard where each operator makes a permanent record of all the business she handles, whether it originates from a guest in his room, or from some department of the hotel, or from parties calling over the telephone from points outside of the hotel.

Each position of the switchboard contains in addition to the usual telephone equipment, a telautograph transmitter and a pilot receiver and keys enabling the operator to write over any line she selects. Certain of the positions have additional receivers to enable the operator to receive written answers on some lines. The switchboard is of the multiple type, that is, all jacks or telephone connections appear in multiple in each position, so that an operator at any position can supply connection through her multiple jack to any telephone connected to the switchboard. For convenience these positions are designated "A," "B," "C," "D," etc., respectively, and the work of the switchboard is divided among the positions, by properly distributing the answering jacks.

For example, "A" and "B" may handle the incoming trunk lines, and these two positions are equipped with telautograph receivers for information service between the switchboard and information clerk in the front office in addition to their pilot receivers which all positions have. "C" handles the house business telephones, that is, all the telephones not in the guest rooms, and also a proportional part of the room telephones. This position is equipped with a telautograph receiver on the line connecting the manager's office with the switchboard and a receiver on the departure service line, in addition to its pilot receiver. The remaining positions handle the guest room telephones, which are divided between them, and a telautograph receiver on the announcing line to the front clerk is located between positions for use in announcing callers to guests in their rooms. Each operator is required to initial every telautograph message with her position sign ("A" or "B" or "C," etc.), also to write the time on each message, except on information messages, where only the position initial is required. This is necessary in fixing re-

sponsibility in case of errors or delays in transmission.

Taking up as an illustration the information service: Practically all of this service consists of incoming telephone calls on the trunk lines from outside parties wishing to talk to guests. The room number of the guest asked for, or his whereabouts, or whether such a party is registered at the hotel, is the information which the operator requires before she can complete the call, and the information clerks who have access to the guest index book are called on to furnish this information. Prompt and accurate information service is necessary to the good reputation of the hotel.

The exact method of handling this service is as follows: Suppose "A" position picks up a party on one of her trunk lines calling for Mr. J. M. Jones. She connects her telautograph transmitter to the information clerk line and writes, "J. M. Jones—A." The clerk receiving the message looks up the name, and if he finds J. M. Jones registered and ready to receive calls, he connects his transmitter to the receiver on which the inquiry is recorded and writes "471." In the meantime the operator at "A" position has requested the party calling to wait a minute, and while the information clerk is looking up the name, the operator attends to other calls or business requiring her attention, and when "471" appears on her information receiver under the name "J. M. Jones," she completes the connection between the party calling on the trunk line and room 471. Occasions may arise requiring any of the positions to write to the information clerk, in which case the position initial on the messages enables the "A" or "B" operator who receives the answer on the receiver before her to notify "D" or "E" position according to the initial. An operator handling an information call may find that the room does not answer when she completes the connection, in which case she offers to "page" the guest, or take a message to be left in his mail box. The procedure in this case is as follows:

An outside party calling over the telephone for a guest who is found not to be in his room, desires to have the guest located if anywhere in the hotel. The party either agrees to hold the wire while the guest is being paged, or asks to have the guest call him at a certain telephone number. In either case the operator connects her telautograph transmitter to the paging line and writes, "Mr. J. M. Jones, Mr. Blank is waiting to talk to you on telephone No. 1957." She uses the number of the trunk line on which Mr. Blank is waiting if he is holding the wire, or the telephone number Mr. Blank gives her, if he does not want to hold the wire. This paging message appears at the front clerk, who tears it off the telautograph receiver and calls a page to execute it. If Mr. Jones is not found, or a message is simply left to be delivered, Mr. Blank is notified, and the message is properly stamped by the front clerk and left in Mr. Jones' mail box.

In much the same manner the telautograph is applied to a score of other purposes such as giving kitchen, bar and cigar orders, hall boy service, departure service and room changes, porter, cashier and all kinds of inter-department service in the hotel. And the great value of the system is that everything is in writing.

This description of the telautograph is taken from *Popular Electricity*:

The telautograph is a delicate electrical mechanism which will infallibly reproduce handwriting at a station as far distant from the sending station as the wires of the system may reach.

You sit down to the instrument, take up the ordinary pencil attached to it, write the message on the paper pad, and instantly slender metal fingers will begin to work up and down like a jumping jack, apparently with random motions, and the message will be transmitted, letter for letter, and an exact copy of the words and handwriting will be recorded by the metal fingers at the receiving pad as instantaneously as the click of a telegraph instrument flies from the sending to the receiving instrument. The distance does not matter. The writing at the other end will be recorded wherever the wires can be carried.

The sending pencil is attached by light rods to two lever arms which carry contact rollers at their ends. These rollers bear upon the surfaces of two current carrying rheostats which affect the strength of the current flowing out over the line.

When the pencil is moved, as in writing, the positions of the rollers upon the rheostats are changed and currents of varying strength go out upon the line wires.

At the receiver these currents pass through two light, vertically movable coils, suspended in magnetic fields, and the coils move up or down against the pull of retractile springs according to the strengths of the line currents. The motions of the coils are communicated to levers similar to those at the transmitter. At the junction of the levers is mounted the receiving pen, which by the motions of the coils, is caused to duplicate the motions of the sending pencil.

Ink is supplied to the pen automatically, and when not in use, the pen rests in the ink, preventing clogging and insuring an ample supply at all times.

Paper for use in the instrument is supplied from rolls five inches wide containing approximately fifty yards, and is moved forward as required by automatic shifters.

The Blackstone hotel will probably be open to patrons the first of the year, and the installation of this novel telephone system, the first of its kind in Chicago, will be complete before that time.

A Telephonic Timepiece

A novel device has been invented for use in hotels, to enable the patrons to determine the exact time at any hour of the day. A small telephone receiver is connected to the head of the bed in each room, and may be placed under the pillow, if desired. The device is connected to a master clock. When the sleeper wishes to know what time it is, he puts the telephone to his ear and presses a button. A set of gongs will then strike the hour, the quarter, and the number of minutes past the quarter.

A report has been received from an American consul in Mexico in which he states that a business man in his district has been granted by the city council a franchise to put in a local telephone exchange. After approval by the governor of the state the work on the installation of the exchange will begin, and application will also be made to the Federal Government for permission to make telephone connection with a certain city in the United States just across the border line. Bureau of Manufactures, file No. 3455.

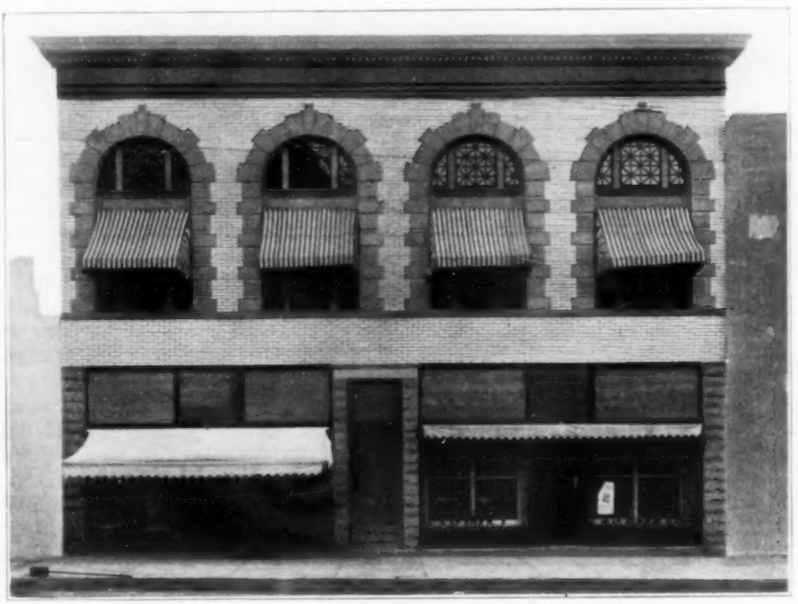
Columbia, Missouri, Independent System

By Alfred H. Rice

FROM the telephone point of view Columbia, Missouri, occupies a strategic position. It is just about midway between St. Louis and Kansas City; and that means that it joins the independent lines of the Kansas City Long Distance Telephone Company and he Kinloch Telephone Company on the one hand, and is directly in the path of the Missouri and Kansas Telephone Company's long distance Bell lines on the other.

What the town of Columbia does geographically the Columbia Telephone Company does literally. Across its modern switchboard independent connects with independent or Bell with Bell impartially.

The Columbia Telephone Company recently cut into service one of the most up-to-date and complete central office equipments to be found anywhere. No expense was spared in giving the installation all the refinements of the most modern practice; for the progressive little city must have a telephone system in harmony with its other features of improvement.



Exchange Building, Columbia Telephone Company.

Colonel J. A. Hudson, president of the company, and his son J. F. Hudson, devoted almost two years to a careful study of the traffic and operating condition in Columbia before a cent was invested in equipment. They studied the products of the various manufacturers as adapted to local conditions, and no detail which would in any way better the operation and the service was overlooked. The switchboard, in fact, was built in exact accordance with their suggestions, and embodies several novel features.

The telephone company occupies a beautiful building on the principal business street of the town, and near the center of distribution. The lower floor of the building is occupied by other business enterprises, but the entire upper floor and basement are devoted to the uses of the company. Just back of this exchange building is a large brick building owned by the telephone company and used for a store house and workrooms.

The equipment for the exchange proper consists of a four-section common battery multiple switchboard accommodating twelve operators, the toll and rural sections forming a part of the main board. There is a one-position chief operator's desk and a fully equipped one-position wire chief's desk. The latter, of course, is mediate distributing frames, the relay and coil racks and the fuse board and power plant.

Each of the four sections of the switchboard is divided into six panels; so that with two panels per operator the whole board has twelve operators' positions. The woodwork of the switchboard is of solid mahogany built upon heavy iron framework. Roller curtains, similar in construction to the cover of a roll top desk, and arranged to operate on the principle of a window shade, close the rear of the board while leaving its interior instantly accessable.

The first position of the switchboard serves as an annex for multiple jacks, bringing them within the reach of the first operator. It is also equipped with grouping keys for switching the cords of any position to the telephone circuit of either adjacent position, and is located in the terminal room with the main and inter- furnished with a night alarm circuit for attracting the night operator when a call comes in.

The second and third positions are alike, and constitute the toll positions. Each is equipped with eight automatic universal cord circuits, of which seven have repeating coil in on all connections, the other pair being so wired as to cut the repeating coil out on through toll connections. Each toll and circuit is provided with a four-party key and three cam levers each operating two sets of springs. The cam nearest the operator is for ringing the toll lines with the high potential, 16 cycle current. The second cam operates two sets of springs; when thrown in one direction the ringing current is thrown on the answering cord and when reversed the operator listens bridged on the cord pair. The third cam enables the operator to cut-off the answering end of the cord and talk to the called subscriber or when reversed to cut-off the calling end and talk to the calling subscriber.

Two test lines to wire chief are provided in each position as well as one line and cord test circuit. Each position throughout the board is equipped with a line pilot lamp and a cord pilot lamp. The rural lines are multipled in front of the toll operator so that the latter can complete any incoming connection without the assistance of any other operator. The equipment is so ar-

ranged that the night operator can handle the whole board from the toll position. In the keyshelf between the two toll positions is a calculagraph.

Positions 4 and 5 have no cord circuits or operators' telephone circuits, the sole present equipment being one test cord and line circuit and two plug-ended trunks from the chief operator's desk, in position 5. These are left unequipped to provide for the expansion of either rural or toll equipment. Position 6 is the present active rural position, and is equipped with 16 automatic universal cord circuits. These circuits automatically adapt themselves to connections between two magneto lines, two common battery lines or a magneto and a common battery line. Each cord circuit has a four-party harmonic ringing key, a listening key, and keys for ringing with high potential current on both front and back cord. All these circuits have repeating coils in circuit on all connections and are arranged for double lamp supervision.

The Operating Room, Columbia Telephone Company.

All toll and rural lines terminate in combined jacks and signals of the type restored by the insertion of the plug in the jack.

Positions 7, 8, 9, 10 and 11 are local subscribers' positions. As the total present number of subscribers answering jacks is 1,200 this gives each operator 240 lines to handle. This is far above the usual number assigned to an operator; but Colonel Hudson adopted it only after the most exhaustive investigation of local traffic requirements had firmly convinced him that it was perfectly consistent with efficient operating. The answering jacks, line signal lamps and the combined jacks and signals in the toll and rural positions are ten per strip.

Position 12 carries, besides its equipment of multiple jacks, only two test lines to wire chief. These are multiples of those appearing in position 2.

Thirty outgoing trunks are multipled throughout the board. They are arranged in three groups each of which is multipled in every third position, giving a group to each operator. The equipment provides a trunk jack to the chief operator, one to wire chief, one for busy back, two for subscribers and rural to toll, and two for subscribers and toll to rural.

An interesting feature of the system is the reverting busy back. This is a busy test adapted to party-line work, and provides for a party calling another on the same line. When this is done the operator receives a peculiar tone which tells her that her calling plug is on the same line as her answering plug. She can then request the subscriber to hang up his receiver while she rings the called party.

Interesting structural features of the switchboard are the steel frame on which the keys are all mounted in the key-shelf and the steel stile casings with metal number plates. The front of the board is lighted by trough reflectors, running the full length of the switchboard. The lamps are so wired that odd-numbered and even-numbered positions are on separate circuits. For rear-of-board lighting, each section is provided with a portable lamp and guard with enough cord so that any corner of the section may be reached.

The operating and terminal rooms are on the same floor and the cables run from the back of the cable turning section direct to the frames.

All cable is supported on a heavy steel rack designed to accommodate the ultimate number of cables.

View of Terminal Room, Showing Power Board.

The switchboard cables contain a sufficient number of wires to care for twenty line circuits. Each conductor is insulated with two wrappings of silk and one of cotton which affords a very high insulating resistance. The conductors are protected with a cotton wrap laid on spirally, a wrap of heavy oiled paper, a layer of heavy lead foil wrapped spirally and lapped, a wrap of heavy oiled paper, a cotton wrap laid on spirally, and finally a close, heavy cotton braid impregnated with slate-colored fireproof paint. This produces a very stiff and firm cable absolutely vermin and moisture proof, which will retain its original shape under pressure.

The intermediate frame to which the cables from the switchboard go, has a capacity of 2,200 lines, and is equipped with terminal strips for the present capacity of the switchboard.

A double-bay relay rack is installed. This contains all the line and miscellaneous relays. Cables of number 19 B. & S. gauge wire connect the connecting rack in the switchboard to the repeating coils which are mounted on a heavy iron rack in the terminal room.

Every circuit is fused on the fuse board in the terminal room, thus eliminating a source of possible danger from fire in the switchboard. Besides this advantage the concentration of all fuses on one board adds to the celerity with which trouble may be located and remedied. When a fuse blows a bell is rung and a lamp lighted; while a bead indicator on the individual fuse assists in prompt identification of the offending circuit.

The main frame terminal blocks are arranged twenty per strip. The punchings are so shaped that a special lug is reserved for test connection, not interfering with the outside line connection.

The storage battery consists of eleven cells of the Electric Storage Battery Company's "F-13" elements in "F-9" jars. The charging current is derived from a forty ampere General Electric Company's mercury arc rectifier, operated on 104 volt alternating current supply. An auxiliary battery of 48 volts assures good transmission on toll circuits.

The power board is mounted alongside the rectifier and carries all the necessary switches and instruments. The Weston ammeter gives readings for either charge or discharge circuit. The Weston voltmeter gives either charge or discharge battery voltage or individual cell readings; the latter being taken by means of an instrument switch. The power board is also equipped with the necessary switches and rheostat for charging the storage batteries from a 500 volt direct current circuit, which is to be used in emergency only. This arrangement is provided for the purely local reason, that it is possible to obtain such current under conditions which will more than balance the rheostat waste.

Charge and discharge and individual cell fuses are assembled on a special battery panel. For ringing, duplicate sets of Kellogg harmonic converters are installed. A Holtzer-Cabot vibrator is provided for busy back, tone test and howler. A howler circuit is installed in each desk, its purpose being to notify a subscriber who has left his receiver off the hook through a peculiar sound in the receiver.

View Showing 200 Pair 20 Gauge Cable Entering the Ground.

The chief operator's desk in the operating room is a one-position mahogany desk with three universal cord circuits, two trunks to switchboard, and two call bell circuits for assembly and dismissal.

The wire chief's desk in the terminal room is a standard one-position desk provided with two trunks to the switchboard and two to the distributing frame. By means of the test lines terminating at the switchboard any line may be transferred to the desk and tested through the switchboard.

Not the least in superiority of this model plant is the outside construction. To begin with, the lines were all rebuilt with new poles with seven and eight inch tops and with butt specifications. The guying is done with iron rods instead of strand. The hardware is all of the best galvanizing. The larger guy rods are one inch by ten feet, and placed in the ground to the eye. The guy rods are run through the hubs of iron wheels, about 30 to 36 inches in diameter, removed from old farm machinery and secured from a junk dealer. To avoid the possibility of these rods pulling out two nuts were used on each rod. A ⅞-inch iron rod is welded with an eye into the eye of a guy rod, with an eye at the other end so adjusted as to reach the top of the pole, around which is placed a heavy iron band made in halves or quarters, as required, and to which the guy rod is secured with an inch bolt on one side and the messenger strand on the other, thus avoiding any "give" by the strand squeezing into the pole. The guy anchors are secured by the old iron wheels at the end of the guy rods, being thoroughly imbedded in the concrete. In this way, with little care in measurements, the length of the guy rod and anchor are easily adjusted so as to hold the pole in correct position. Light guys are of smaller size. It will be found that this system of guying will not be so very much more expensive than the use of strand and wooden "dead men" and will stand several times longer. Furthermore, there will be no "give" as is usually the case with strand.

View of 250 Pair Cable, with Three Legs—Two 100 and One 10.

The cable strand is of Siemens-Martin and is unusually large, running from ⅝ to ⅜ inches. The cable is of No. 16 B. & S. gauge for toll lines and No. 22 for local lines, and of .08 regular and .054 mutual capacity. The underground conduit is of McRoy clay inspected stuff,

heavily imbedded in concrete all round. The messenger cable is grounded with copper at every pole to protect the cable from electric light wires as well as lightning. It has been found with these frequent grounds that electric light wires coming in contact with the messenger, burn in two instead of burning the strand. The drop wires, of tested rubber duplex, are strung on No. 10 double galvanized steel from the main cable messenger to the house.

All can tops are fully protected which is novel and new for a city the size of this one. Practically all telephone wires throughout the city are in cable, there being very little open wiring and this speaks well for the progressiveness of the company.

The subscribers' telephones used in connection with this central office equipment were made by the Kellogg Switchboard and Supply Company. The exchange equipment was manufactured, except where otherwise specified, by the Western Electric Company, and was all installed by that company.

Seeing by Telephone

To allow people conversing by telephone to see one another is known to be the ultimate goal of those inventors to whose labor we are indebted for the evolution of telephotographic apparatus. As the problem did not so far admit of any practical solution, inventors have, in fact, been satisfied with transmitting, by wire, photographic pictures, diagrams, handwriting, and the like. According to reports just received from Denmark, a satisfactory solution is now offered. In fact, two young Danes (the brothers Andersen) recently called at the offices of Politiken, the well-known Copenhagen daily, in order to submit to the editor the principle of their idea, particulars of which cannot yet be given out. Unlike the Korn apparatus, optical transmission, according to their scheme, is not effected by means of any material sensitive to light, such as selenium, nor is a picture produced by photographic or mechanical means as in all the apparatus so far suggested. Transmission, in fact, takes place simultaneously, so as to reproduce any objects situated at the sending station in their natural colors and motions, their dimensions, however, being reduced.

The apparatus is connected by a contact with the telephone wire, when the acoustic or optical currents can be thrown alternately through the line. The operator is thus able at will to show himself, or to bring before the eyes of the person at the other end any objects he may like to show him. As the apparatus, so far from being necessarily located immediately beside the telephone, can be used within a considerable range, provided the contact be obtained, the possibilities of this invention are obviously many. Further details will be awaited with interest.—*Scientific American.*

Western Union Tries Telephones

Transmission of commercial telegraphic messages by means of the telephone is being tried by the Western Union Telegraph Company, from its Chicago offices. Apparatus has been installed in the Joliet office, about 40 miles from Chicago, and experiments have been carried on for the last month. The regular telegraph wire is used for the long distance communications by voice. Several roads in the United States are also using the telephone instead of the Morse code of dots and dashes to operate trains.

The Chicago Joliet telephone wire is said to be the first installed in this country for commercial telegraphic purposes. If it proves successful the system will be extended to other nearby points like Rockford, Aurora and Elgin, it was said. The system may eventually be used for greater distances, even for cross-continental business.

Interstate Enjoined From Selling

Vice Chancellor Howell has granted an order at Trenton, New Jersey, restraining the transfer of any of the property or securities of the Interstate Telephone Company to the American Telephone and Telegraph Company or any of the subsidiary corporations comprising the Bell system. The order also restrains the American Telephone and Telegraph Company and its associated corporations from taking any steps, directly or indirectly, to have the Bell system acquire control of the Interstate Telephone Company.

The application for the injunction was made by former Attorney General Robert H. McCarter on the ground that the proposed sale of the Interstate Company to the Bell system is in violation of the terms of an agreement under which about 78 per cent of the holdings in the Interstate Company were pooled and deposited with the Mercer Trust Company.

The bill of complaint set forth that many of the franchises obtained by the Interstate Company were granted on the express understanding that the lines to be constructed were to be maintained and operated in competition with the Bell system. As a result of combinations with other companies it was claimed that the Interstate Company now controls about ten thousand telephones in New Jersey and has connections with 237,000 other telephones in New York, Pennsylvania, Ohio, Virginia, West Virginia, Delaware and Maryland.

The complainants alleged that as a result of these and other combinations throughout the United States there are now telephone lines of sufficient magnitude to compete successfully with the Bell system unless the latter should be successful in its attempt to absorb or acquire control of the independent lines.

The Telephone Detective

Old Jerry Blunt, engineer of the "Castle Building," loves to tell how he caught the detective at an unprofessional job.

One day a man in workman's dress, carrying a kit of electrician's tools, bustled into the building.

"Where are the telephone connections?" he asked, and the unsuspecting Jerry showed him. The stranger was smooth talking and agreeable, but when he came every day at the same hour and tapped the drug-store wire, Jerry began to smell a rat. The man did nothing but listen to conversation that came from the drug store pay station. Jerry quietly notified the telephone company, and they sent a man to investigate. The busy stranger was arrested, and finally admitted that he was a detective, spying upon a woman who went to that drug store every afternoon and talked over the telephone about a divorce case in which she was interested. He was getting evidence, and it seemed a shame to stop him, because it might have made such juicy reading in a yellow journal.

Who's Who in the Telephone Game

Facts and Fancies About a Man You Know or Ought to Know

THE circus was coming. The caravan with its calloused elephant and moth-eaten dromedary had been seen in an adjoining township and it would pass right in front of the Vail house within a day or two. It was late in getting around that year, for there were eight long rows of potatoes in the patch at the far end of the orchard still waiting to be dug, and Ted just had to dig them before his father would unwind the string to his leather purse and relinquish a precious dollar to defray the circus expenses of his young hopeful, who had earned the holiday.

When the task was finished and the glistening piece of silver struck the palm of that chubby chap of fourteen, he passed it from one hand to the other, back and forth, not knowing for the moment what to do with it. For a boy who had little need of money and who was consequently awkward in its presence, this was a considerable sum. The occasion seemed to require something more of an acknowledgment than the heap of tubers on the cellar floor. It was a critical instant of embarrassment, but it gave birth to this epigram which passed from the son to the father—"The loneliest object in the world is a dollar without another dollar alongside it."

That was fifty years ago, if it was an hour, for Theodore Newton Vail, president of the American Telephone & Telegraph Company is sixty-four. He is now the head of the largest industrial organization in the world, as well as the best living refutation of the Osler theory.

He is a Total Failure at Retiring.

This early sympathy for a lonesome dollar has resolved into a grand geometrical scheme whereby all dollars might become intimately associated to the point of calling each other by their first names. Five hundred million of them are keeping company around the American T. & T. standard and on the early conceived notion that a lone dollar is a lonesome thing, and that two dollars will pine away until two more get alongside, this crowd of $500,000,000 is right now in the sad, dejected plight of craving the association of another equal number. What is more, there is actual promise that Mr. Vail's ambition to preside over a billion dollar corporation will be realized. [It is a kindness to the compositor to speak of these amounts in romans instead of numerals, because fonts of type have limitations whether Mr. Vail has or not.]. The important thing about an inconceivable billion dollars is that such an aggregate is essential to partially represent the telephone business from an operator's viewpoint.

Theodore N. Vail is a big man in charge of a big company. He is big in depth and breadth, mentally and physically. He has a big head on big shoulders—a big brain, a big vision—a big girth at his equator. He has always been doing big things. Of all the who-who's in the telephone business, here's the big who's who.

At thirty Mr. Vail got into the game. The telephone as an invention was capitalized at $300,000, and Alexander Graham Bell's lawyer felt that T. N. Vail was the man of all men to develop the possibilities of Bell's invention. Prior to this, Mr. Vail had evolved the successful plan of handling mail on railways; systemizing the postal service and establishing rapid service. As the government's superintendent of railway mail service he was getting along finely until an economic congress cut his pay. That was fortunate for the telephone business, because the U. S. Ex.-Supt. R. M. S. promptly began nationalizing the telephone.

Mr. Vail devoted his tremendious energy to telephone interests continually from 1878 to 1887, when he resigned his position as general manager to engage in enterprises of his own. He familiarized himself with continental affairs, residing for a time in Italy. He promoted and completed large works in South America. The lighting and street railway systems of Buenos Ayres are examples.

Every man has his hobby. The president of the A. T. & T. Co. has two—to retire from active business and to farm. He is a total failure at retiring. He has tried many times, but he is the poorest retirer that ever tried. It's that great sympathy he has for the lonesome dollar. A dollar all alone by its lonesome is the lonesomest lonely thing in the world, and Mr. Vail knows it and his associates know it. All they have to say to him is: "There's another, all alone, you must get it a partner," and then he's back on the job again.

But his other hobby. Oh, splendid, splendid! He has a farm of five thousand beautiful acres at Lyndonville, Vermont. He finds time to get out to this place now and

then, and your Uncle Josh Whitcomb is all to the bad by comparison when Theodore comes home; gets into his loose clothing and mixes with his live stock. He has another farm out in the corn belt in Iowa, where he knows his neighbors and where the neighbors know him, but he specializes at plain and fancy work in Vermont, where the Bell brand of butter, beef, bologna and bacon has more than a local reputation.

Telephone men all over the world knew when Theodore N. Vail was dragged out of his last retirement to the presidency of the American Telephone & Telegraph Company. There has been a stir ever since. He is an optimist in directing affairs. He has only recently said that half a billion dollars will be spent by telephone companies in the next ten years. That's $50,000,000 a year —$137,000 a day—every day, Sundays and holidays! It's a conservative estimate by an intelligent and conservative estimator who will probably spend nearly that much in the development of his own concern.

Unlawful Use of the Telephone

The quick communication provided by the telephone has been repeatedly made use of by men engaged in criminal lines of business.

Ed. Sharp conducted a gambling establishment, contrary to the statutes made and provided; and what was worse, he made no proper arrangement with the police. Consequently Ed. was *persona non grata* to the force. Just around the corner his most loyal friend, Gunderson, ran a saloon. Gunderson stood in with the Captain, the officers loafed around his place, and Gunderson had a telephone. Ed. Sharp applied for one, so that Gunderson could keep him posted. The telephone company refused to install the instrument, because they suspected that Sharp wanted the telephone to provide a means by which Gunderson might warn him of any attempt to raid his den.

"I'd like to know if it's any o' your business what I want with a telephone. I want it, and I'll pay in advance."

"Can't put it in," said the manager, and Ed. threatened to sue him. But Ed. thought better of it, and concluded that the courthouse was no place for him. There the matter rests.

If the telephone company knowingly install an instrument and permit it to be used for criminal purposes, it might possibly become a party to the crime, and criminally liable either in its corporate capacity or through its officers. Genial Bob Ellis, manager at Jonesboro, will swear that such a catastrophe might occur.

Jonesboro is the dryest town in the dryest section of the most arid prohibition state. Forty miles away, across the state line, lies Westville, the wettest town in the sloppiest county of a rampant antiprohibition community. Irrigation for Jonesboro comes from Westville, and dampens the trail between. Westville barkeepers know the interstate commerce law better than they know the multiplication table. They can recite it backward and forward with their hands tied behind them. They keep the express company very busy carrying jugs.

Bob Ellis likes to be accommodating. When his patrons used to telephone from Jonesboro for a quart bottle sent to them by express, Bob received the money from the thirsty patron and remitted it to the liquor dealer. That is where Bob got too genial—likewise Bob got a rake-off.

Things rocked on very happily until an unsympathetic grand jury indicted both the telephone company and Bob. The courts held that Bob was the agent of the liquor dealer in making the sale, receiving and transmitting the money for the whisky. Bob got a $200 fine with thirty days to meditate upon the uncertainties of the law. Bob also lost his job.

Race-track gamblers in Missouri use the telephone to evade the law. The result of races is transmitted by wire to pool rooms in Kansas City, Kansas, where the bookies settle bets with all the lambs.

Governor Folk got after the bookmakers and tried to enforce the stringent anti-gambling law of Missouri. But the Supreme Court of the state held that "a telephone receiver and transmitter cannot be said to be an instrument for the purpose of recording or registering bets." This put a chunk in the wheel for a while until a new law can be made, or a new way found to enforce the old law.

Telephones, being frequently used for this purpose, are subject to the time-worn game of "tapping the wires," which has been diligently worked and often described. The method is simple. First the grafter decides on the pool room and the bookmaker whom he intends to victimize. Then he secures access to the telephone wire which serves that particular bookmaker. This may be tapped on top of some house, or a wire may be diverted to a room near by which the grafter has rented. The grafter then listens for the message to the bookmaker announcing the result of a race. This announcement the grafter intercepts, and delays until his accomplice can saunter into the pool room and lay his bet on that particular horse. The grafter's accomplice knows the winner ten minutes in advance of the bookmaker. He lays his bet, gets his ticket, and ten minutes later when the delayed announcement is sent in over the wire he cashes his winnings. It's a "sure-thing play" which demonstrates the fact that there are many openings in this country for active and ingenious gentlemen.

The confidence man and passer of raised checks finds his occupation most precarious; the banker can step to the telephone, ring up the signer of the check and find out instantly if it be all right.

Cuba Telephone Concession Canceled

President Gomez has issued a decree canceling the contract of the Havana Telephone Company for the exclusive right in Havana and empowering the Cuban Telephone Company to establish local and long-distance systems in accordance with the telephone law passed by Congress July 18.

Telephones in Madagascar

A forty-six mile telephone service was inaugurated at Diego Suarez, Madagascar, in July, making four towns thus equipped, the others being Tananarive, Tamatave, and Majunga, with a total of 175 miles of wire.

Standard Copper Wire Specifications

THE wire committee of the American Society for Testing Materials has prepared the following standard specifications for hard-drawn copper wire, including round wire, grooved trolley wire and cable or standard wire. The text of the specifications as presented and the explanatory notes of the committee, with the exception of grooved trolley wire specifications, are as follows:

PROPOSED STANDARD SPECIFICATIONS FOR HARD-DRAWN COPPER WIRE.

1. The material shall be copper of such quality and purity that, when drawn hard, it shall have the properties and characteristics herein required.

2. These specifications cover hard-drawn round wire, grooved trolley wire and hard-drawn cable or strand, as hereinafter described.

3. The wire, in all shapes, must be free from all surface imperfections not consistent with the best commercial practice.

4. (*a*) Package sizes for round wire and for cable shall be agreed upon in the placing of individual orders; standard packages of grooved trolley wire shall be shipments upon reels holding about 2,500 pounds each.

(*b*) The wire shall be protected against damage in ordinary handling and shipping.

5. For the purpose of calculating weights, cross-sections, etc., the specific gravity of copper shall be taken as 8.90.

6. All testing and inspection shall be made at the place of manufacture. The manufacturer shall afford the inspector representing the purchaser all reasonable facilities to enable him to satisfy himself that the material conforms to the requirements of these specifications.

HARD-DRAWN ROUND WIRE.

7. (*a*) Size shall be expressed as the diameter of the wire in decimal fractions of an inch, using not more than three places of decimals; *i. e.*, in mils.

(*b*) Wire is expected to be accurate in diameter; permissible variations from nominal diameter shall be:

For wire 0.100 inch in diameter and larger, 1 per cent over or under.

For wire less than 0.100 inch in diameter, 1 mil over or under.

(*c*) Each coil is to be gauged at three places, one near each end, and one approximately at the middle; the coil may be rejected if, two points being within the accepted limits, the third point is off gauge more than two per cent in the case of wire 0.064 inch in diameter and larger, or more than three per cent in the case of wire less than 0.064 inch in diameter.

8. The wire shall be so drawn that its tensile strength and elongation shall be at least equal to the values stated in the following table. Tensile tests shall be made upon fair samples, and the elongation shall be determined as the permanent increase in length, due to the breaking of the wire in tension, measured between bench marks placed upon the wire originally 10 inches apart. The fracture shall be between the bench marks, and not closer than one inch to either mark. If upon testing a sample from any coil of wire, the results are found to be below the values stated in the table, tests upon two additional samples shall be made, and the average of the three tests shall determine acceptance or rejection of the coil.

Diameter, inches.	Area, circular mils.	Tensile strength, lbs. per sq. in.	Elongation in 10 in. per cent.
0.460	211,600	49,000	2.7
0.365	133,200	53,000	2.4
0.325	105,600	54,500	2.3
0.289	83,520	56,000	2.1
0.258	66,560	57,500	2.0
0.229	52,440	58,500	1.9
0.204	41,620	59,500	1.8
0.182	33,120	60,500	1.7
0.162	26,240	61,500	1.6
0.144	20,740	62,500	1.5
0.128	16,380	63,400	1.4
0.114	12,996	64,200	1.3
0.102	10,404	64,800	1.2
0.091	8,281	65,400	1.1
0.081	6,561	65,700	1.0
0.072	5,184	66,000	0.9
0.064	4,096	66,200	0.9
0.057	3,249	66,400	0.8
0.051	2,601	66,600	0.8
0.045	2,025	66,800	0.7
0.040	1,600	67,000	0.7

For wire whose nominal diameter is between listed sizes, the requirements shall be those of the next larger size included in the table.

9. Electric conductivity shall be determined upon fair samples by resistance measurements at a temperature of 20° C. (68° F.). The wire shall not exceed the following limits:

For diameters 0.460 inch to 0.325 inch, 900.77 pounds per mile-ohm at 20° C.

For diameters at 0.324 inch to 0.040 inch, 910.15 pounds per mile-ohm at 20° C.

HARD-DRAWN COPPER WIRE CABLE OR STRAND.

14. For the purposes of these specifications, standard cable shall be that made up of hard-drawn wire laid concentrically about a hard-drawn wire center. Cable laid up about a hemp center or about a soft wire core is to be subject to special specifications to be agreed upon in individual cases.

15. The wire entering into the construction of stranded cable shall, before stranding, meet all the requirements of round wire, hereinbefore stated.

16. The tensile strength of standard cable shall be at least 90 per cent of the total strength required of the wires forming the cable.

17. Brazes, made in accordance with the best commercial practice, will be permitted in wire entering into cable; but no two brazes in wire in the cable may be closer together than 50 feet.

18. The pitch of standard cable shall be not less than 12, nor more than 16, diameters of the cable. The cable shall be laid left-handed or right-handed, as shall be agreed upon in the placing of individual orders.

EXPLANATORY NOTES ON PROPOSED SPECIFICATIONS FOR HARD-DRAWN COPPER WIRE.

5. The specific gravity of copper has been commonly accepted as 8.9, and this value is retained in the proposed specifications. The maximum variation from this figure in a large number of samples of wire has not been sufficient to lead one to anticipate any serious error from its use as a flat value in calculations.

7. (*a*) The use of arbitrary gauge numbers to express dimensions cannot be too strongly condemned. There are many such gauges in existence, and confusion is to be expected unless the particular gauge to be used is specified. Many of the gauges have their dimensions stated in absurd figures, such as 0.090742 inch, when it is not especially easy to measure dimensions in the fourth decimal placed by workshop tools. Definite diameters in measurable units are evidently preferable.

8. Many other physical tests than those provided in these specifications are included in existing specifications. The reasons for the omission of some of the more common are given as follows:

Twist Tests.—The wire is sometimes required to permit twisting through a stated number of revolutions before breaking. The results are so easily influenced by temperature, speed of rotation, method of gripping, and other variables not easily defined or controlled, that the test is at least of doubtful value. It is the opinion of the committee that it is impractical to so define the conditions of the test that a twist can be made definite and reliable; hence there is no warrant for its inclusion in specifications.

Wrap Tests.—Wire is sometimes required to permit tight wrapping about a wire of its own diameter, unwrapping and again rewrapping. It is obvious that the making of a test of this kind with wire that is already hard-drawn is exceedingly difficult. Every one who has tried to break off a piece of tough wire by bending it back and forth between the fingers knows how hard it is to confine the bend to one place, because of the hardening action of the previous bends. Hard wire which has been wrapped around a wire of small diameter is hardened still more, and it is almost impossible to straighten the wire, let alone recoil it in the opposite direction. In the opinion of the committee, it is inadvisable to include a test which at best is so indefinite as a wrap test. Furthermore, it is the opinion of the committee that wire which will meet the physical tests included in the proposed specifications will meet any properly made twist or wrap test that would reasonably be required.

Elastic Limit.—During the tension test on wire there is seldom to be observed any definite drop of the beam or increase in the rate of elongation, corresponding to the yield point commonly observed in testing steel. The only way in which the elastic limit of hard wire may be determined is by the actual plotting of the elastic curve from extensometer readings. Even such tests are difficult of interpretation, because the wire when available for tests is usually curved, due to its having been put up in a coil. There are little sets observable before the true elastic limit has been reached, owing to the fact that one side of the wire, having been stretched in coiling, is really a little harder than the other side, and the pull is, therefore, not even. Considering the difficulty of making the test and the uncertainty of the results obtained, it is the opinion of the committee that it would be inadvisable to include an elastic-limit test in the proposed specifications. It is evident that if the designing engineer requires a knowledge of the location of the elastic limit for purposes of calculation in designing, such data can be obtained by special tests on representative sizes of wire, which will fix the relation of the elastic limit to the ultimate strength for all wire which is properly made.

Elongation.—Elongation tests on wire are required in different specifications to be measured in lengths varying from 8 to 60 inches. The elongation has variously been measured as the permanent increase in the length of the wire, measured between bench marks placed on the wire before fracture; as the elongation measured between the jaws of the testing machine, which are adjusted to grip the wire with a certain definite free length, and in various other ways. Perhaps the most commonly used length is 10 inches, and it is a good length, because measurements may be immediately transposed into percentages without laborious calculation. Measurement of elongation in any other way than as the permanent increase in length between bench marks, in the manner customary in the measurement of steel elongation of specimens, is open to criticism. If measurements are made between the jaws of the testing machine there is included a certain amount of elongation which has taken place within the jaws, because the wire, in stretching, will have been reduced in diameter and, therefore, have stretched to a greater or less extent within the jaws themselves. If the measurement is made between bench marks on the wire just prior to breakage, there is included in the elongation a certain amount of elastic deformation.

9. Electric conductivity is usually expressed as a percentage on the Matthiesen basis, reference being made to determinations of the electrical resistivity of supposedly pure copper by Matthiesen about 1865. Since that time the methods of refining copper have greatly improved, so that today it is not uncommon to find copper of over 100 per cent conductivity on the Matthiesen basis. Furthermore, what the electrical engineer requires is that the wire shall not exceed a certain maximum electrical resistance. It seems obvious that it is less laborious to express quantities in direct definite terms rather than by reference to something else which requires interpretation before the results are ready for use in calculation. Resistivity is commonly expressed in a number of different ways, all being equivalent to the resistance of some unit of cross-section, this unit being expressed either in linear dimensions or as a combination of weight and dimensions. For convenience we give a table of equivalents of the values for electrical resistance included in the proposed specifications. The values are equivalent, respectively, to 97 per cent and 96 per cent conductivity on the Matthiesen basis:

900.77 pounds per mile-ohm is equal to:
- 0.15776 ohms per meter-gram,
- 1.7726 microhms per centimeter-cube,
- 0.69789 microhms per inch-cube,
- 10.663 ohms per mil-foot.

910.15 pounds per mile-ohm is equal to:
- 0.15941 ohms per meter-gram,
- 1.7911 microhms per centimeter-cube,
- 0.70517 microhms per inch-cube,
- 10.774 ohms per mil-foot.

10. It is obvious that the simplest designation of irregular shapes of similar outline is by sectional area, and the most commonly used unit among electrical engineers is the circular mil. Therefore, while the sizes of grooved trolley wire regularly used are genrally known by B. & S. gauge number, corresponding to their sectional area, it has been deemed advisable by the committee to list these sizes in specifications, by their sectional area expressed in circular mils. The three sizes which are most extensively used commercially are the only ones

listed; a fourth size is but little used, and the use is growing less.

11. The only way in which gauge variations are easily determinable in irregular shapes is by recourse to weights of standard lengths, and this has been the method adopted in the specifications.

14. So many variations in the construction of cable are possible, that it has been deemed inadvisable to complicate the specifications by including requirements for any other than the one type most commonly used.

16. Physical testing of cable is at best a difficult matter, and measurement of elongation in cable which has been subjected to a tensile test is uncertain, since it includes both the elastic deformation of the cable as a spring, the actual elongation of the wires, and perhaps even some elastic deformation of the wires as such. It is, therefore, thought inadvisable to include a requirement covering an elongation test.

17. The permitting of brazes in wire entering into the construction of copper cable was discussed at considerable length, and it is finally the opinion of the committee that, provided no two brazes are closer together than 50 feet, the cable has fully 90 per cent of the theoretical strength obtained by adding together the required strengths of the constitutent wires. This is due, in such long lengths, to the frictional gripping of the wires in the cable. The construction of long lengths of cable without brazes is costly, and it has been thought best, therefore, to permit their use, provided they are sufficiently widely spaced as not to be detrimental to the cable's strength.

Some Questions Answered

By J. C. Kelsey

[This department is at the command of our readers. Questions relating to all branches of telephony—technical, financial, ethical, or otherwise—are invited, and will be answered in the order received. Names of inquirers will not be used unless desired.—*Editors.*]

A certain great express company, earning millions annually, is controlled by a family of Platts. Some time ago, a minor stockholder, weary of being an investor in the securities of such a respectable but so poor a concern, asked for a receiver to stop the loot by winding up its affairs.

Frank Platt, a member of this controlling household, revealed the prevailing American spirit when he testified that he had never paid attention to the interests of the minor stockholders, "because they did not amount to much." This wolfish statement reveals the depravity that has crept into some of the big American business interests of today. It shows the joke in a nutshell, that America is the "land of the free and the home of the brave."

The American Telephone and Telegraph Company owns 80 per cent of the stock of the Western Electric Company. Some time ago it owned but 58 per cent, or 98,000 shares. It organized a crafty little game and frightened 32,000 shares from cold-footed officials and employes. It served notice upon the outstanding 30,000 that they would be sorry if they did not accept the philanthropic offer of the great American benefactor, the American Telephone & Telegraph Company. Like the express company, the minor stockholders of the Western Electric Company, as well as most of the licensee Bell companies, are in the same boat.

The other day a distressed minor, dreading to lose what he had, went on theoretical knees to the shrine of the great Bell "I am" and asked for quarter. In derision, it is said, this man was told to look at the books, and if he found anything to let them know, and they would mail it to him.

* * *

There seems to be a higher law. Did not Mr. Baer testify that God and himself controlled the hard coal business?

Does not Rockefeller flirt considerably with God in his control of oil and everything else that is loose?

Did not the Bell company at one time refuse to leave a telephone in a house where a man swore, or where men and others violated the ten commandments?

The Heavenly Father has been in bad company for countless years. It has been always that men and women were burned or hanged or buried because they did not pray to suit a particular class of people.

The contempt for the public was first voiced by the celebrated ex-ferryman, Vanderbilt, who exclaimed in passionate frenzy that the "public be damned!" The latter day idea is to go further and crucify the interests who furnished money in earlier days and whose usefulness is now destroyed—hence the change of the Vanderbilt hymn from the "public be damned" to "minor stockholder be damned."

A great leader of this new gospel is the A. T. & T. Co. It has been working a panel game upon its minor stockholders ever since the organization at Boston got under way.

Mr. Minor Stockholder of the Western Electric Company, you are a respectable and a fairly well off man, or you could not have bought such a high-priced stock. Of course, you know that your company sold $68,000,000 worth of goods in 1906, and did not make a cent. You were told that the great rush of business burdened your company with additional expense. You know that 1907 showed $50,000,000 worth of business, and you had a most mournful report on the finances of the company. You were told that bonds would have to be sold. Say, it was awful! You further know that 1908 showed $36,000,000 worth of business, and still no sign of profits. The dividend was to be paid, however, out of the surplus. An unexpected kindness, by the way! In 1909 you will learn that your beloved company will do about $43,000,000 worth of work, and you may as well prepare for the worst, for there will be the usual pitiful cry of poverty!

Can you beat it? If the statements can be accepted at face value, can you find elsewhere so much assininity and stupidity crowded together under one legal title?

Industrial history offers no parallel. Think of it—such business as $68,000,000, or even $36,000,000, any one year! And no profits!

Why does the Western Electric Company carry blue Bell advertising in all of its expensive magazine adver-

tising? What right has a major stockholder of a company to use that company as a vehicle for the progress of his own private company?

Why does the Western Electric Company send its salesmen out broadcast, to show to the independent operator the beauties of sub-licensee relations with the Bell company?

Recently a closely importuned independent operator, after several days of worry, asked a Western Electric employee if he was a sub-licensee man of the Bell. Even after several days, he did not suspect that the man was supposed to serve the interests of the Western Electric Company.

Not only are the popular magazines carrying expensive Bell advertising at the expense of the Western Electric Company, but the employes as well are carrying Bell advertising.

"Blessed are the meek." Scripture promises that the meek shall inherit the earth. I will bet all the dollars that I have not, that meekness will not enable anyone to inherit the Western Electric Company.

In 1907, you were offered a chance to trade one share of your stock to "the Bell" for two and one-half convertible bonds, which were then quoted at $68 each. But in the midst of the alluring and most philanthropic proposition, you noted that the buyer reserved the right to pay you $225 cash. You stock cost you all the way from $280 down to $250. You were invited to accept a loss, if the major interest saw fit. At that time they called that cash offer a real case of philanthropy.

You knew that a rise in stock values was due. You knew, in your own heart, that ordinarily the bond trade was a fair one, if you were content to get your money back. You would have accepted the offer then were it not for the $225 cash option. You were threatened—you were confronted with a bond issue—but you did not join the stampede.

Do you know that a man is foolish to give something worth $400 and $500 for $225? Of course you do.

Do you know that the Western Electric Company has over $300,000,000 worth of real estate and property? Do you know that it carries $20,000,000 worth of material in stock and in process? Do you know that $50,000,000 would not be considered by the Bell Telephone Company for one minute, were a cash offer of that size made? It has millions of reserves and other items that ought to exist, but they have been written off.

And as a minor stockholder are you going to smile and smile again when you know that you are being cleaned out in a most stupid manner?

Say, the pillage of American savings is fierce. A man saves his money and deposits it in the kitchen stove or in the back yard. A common sneak thief gets it.

He saves his money and buys a high-priced stock. He is rifled by thieves in fur coats and chuggy automobiles.

He saves his money and puts it in a savings bank. A Stensland comes along and takes it.

But we have reached such a state of culture that we won't fight. We fear trouble. We are a nation of boneheads, principally. We take our whippings and lick the hand that wields the whip. As a minor stockholder, are you going to stay in this class?

* * *

How does all this affect the independent telephone operator? The operator has won a magnificent victory. He holds the local field alone. He is now monarch of all he surveys. The local field is all there is worth while.

Mr. Operator, there is a serpent in your Eden. He is whispering into your ear all about the joys of long-distance connection and of the terrible mistake of duplication. These are the only things the A. T. & T. Co. can talk about—it has tried every other issue.

There is no duplication! If there was, do you suppose you would be approached by overtures of peace?

There is no advantage in long-distance connection. Take care of your local service. Ninety-five per cent of your people who use it alone will compel the remaining five per cent to retain it. It is this paltry five per cent who are backing those who whisper into your ear about the advantages of a Bell license. The biggest coward on earth is a business man. It makes no difference where the business man lives—New York, Chicago, or Willis, Kan. He is that same cowardly fool who dreads prohibition because it will hurt business. He may have five sons and five daughters in danger, but that counts for naught when business is in imaginary peril.

Do you know that a committee of Boston business men called upon the Boston Tea Party and begged them to go home and not dump the tea into the harbor, because there might be some trouble, and business might be hurt?

But they did throw the tea overboard and George Washington and the continental troops started a republic. The descendants of these timorous business men of Boston are all rich, and have not added any bravery to their mental and physical stature.

Mr. Independent Telephone Operator, you have bankers and business men as directors. Go after them now and educate them to resist the pleading of the sub-licensee man. Can you expect any mercy from an enemy who has shown you the white flag and caused you to disarm, when it is a notorious fact that it has pillaged its minor stockholders universally?

You do not hire a young man of well-established evil habits to take care of your cash drawer, nor do you invite him to your house to meet your family.

I wonder, of course, how the licensee companies like the idea of the independent interests getting better prices than they do. The pockets in this great shroud are all the same, in spite of the fact that we are taught that a shroud has no pockets. I have checked countless bills against licensee companies and I know that prices have been more than cut in two parts. The whole game is that the A. T. & T. Co. has failed to make an impression on independent interests and is trying the fool game of breaking the independent telephone manufacturer. Should it accomplish this, there would be such a dizzy rise in prices that Western Electric stock could not be bought for even $1,000 a share.

Moral: Call the police!

A Liquid Microphone

Prof. Q. Majorana uses a liquid microphone in connection with his new system of wireless telephony. It consists of a small tube attached to the diaphragm of the microphone and through which a stream of water flows between a pair of platinum electrodes. The water is slightly acidulated, so as to complete the circuit between the electrodes. However, when the microphone is vibrated by the voice the stream of liquid fluctuates, varying the electrical resistance in accordance with the sound of the voice.

Canadian Municipal Telephone Reports

By John R. Marshall

AT a recent convention of the Union of Canadian Municipalties held at Medicine Hat and Calgary, Alberta, some very interesting facts were brought forth concerning government-owned and municipal telephone systems.

D. C. McNab, inspector of rural telephones, Regina, Saskatchewan, spoke of the legislation of 1908, which resulted in the purchase of two long-distance lines then in operation in the province and the subsequent encouragement of the formation of small companies for the building and operation of rural lines.

The decisions arrived at were crystallized into legislation and expression given to them in what is known as the Rural Telephone Act, the outstanding features of which are provisions for:

(1) Government supervision.

(2) Organization, incorporation and registration of companies free of charge.

(3) Limitation of capitalization.

(4) Limitation of number of shares to be held by any one subscriber.

(5) Limitation of dividend to be distributed.

(6) Prevention of exclusion of any person who lived within reasonable distance of the line from getting service.

(7) Control of rates.

(8) Control of interchange of business between companies.

(9) Assistance by way of grant of free poles under conditions to be laid down by the lieutenant-governor in council.

(10) Exemption from taxation.

It was expected that considerable activity would follow publication of the terms of the act and the conditions upon which the grant of poles would be made had to be immediately fixed. Those decided upon were as follows:

(1) "All lines to be metallic."—As it was expected that these lines would likely request long-distance connection, it was felt that the best construction was not too good.

(2) "An average of one subscriber per pole mile of proposed system to be secured."—This was to ensure that some considerable portion of the settlement would participate in the benefits of the grant.

(3) "Renters of phones not to be counted in making up this average."—The purpose of the act was to help those who were willing to contribute something towards helping themselves.

(4) "Connection to be given with one town only."—This is a provision for the protection of the long-distance service.

(5) "Directors of rural companies to be bona fide residents of rural districts."—This regulation is intended to preserve to the farmers the management of these lines.

(6) "Full cost of proposed system to be secured in money or notes, and deposited in bank, and advice of amount forwarded by the manager to department."—As the money was to be required immediately upon completion of incorporation, it was thought wise to have advice that the necessary funds for erection of the system had been secured before poles were shipped and perhaps distributed along the roadways.

Expectation for increased interest in telephone matters through the rural district was realized. Inquiries for further information, such as cost of material, method of procedure in forming companies, etc., came pouring into the department, and where replies by letter failed to convey the information which satisfied, a representative from the department was sent to assist with advice.

As to results, there are today 61 incorporated farmers' companies with an aggregate capitalization of $190,500, undertaking to construct 1,706 miles of rural system under government supervision, and supplying 1,712 rural subscribers with telephone service. Three of these companies completed their system in the fall of 1908; a number of others have completed theirs during the present season; the majority of the balance are busy completing their lines; and to the remainder poles are daily being shipped. It is expected that all will complete their systems this year.

Besides the above, the incorporation of 25 other companies representing 545 miles of system is in process of completion. Many of these it is expected will also complete their system during the present season.

Over and above the companies that have been incorporated and those under process of incorporation, 170 sets of organization forms have been supplied to applicants from whom advice had been received that their respective communities were ripe for the organization of telephone service.

Reeve Ivens, Wallace, Manitoba, said: "About three years ago the Manitoba legislature passed an act which provided for the construction and ownership of telephone systems. Last year the municipality of Wallace sold $50,000 worth of four per cent debentures guaranteed by the government for this purpose, for which they received 95.60. This year they received 97, which I think compares favorably with the debentures sold by most of our cities.

"The municipality of Wallace is favorably situated for building a rural telephone system. It is about 24 miles by 18 wide, and it lies along the main line of the C. P. R. Two incorporated towns lie within its boundaries, so that the government of Manitoba when it took over the Bell company's system operated the two systems in the towns that lie within the municipality, and all we had to do was to build rural lines through the country to the edge of the town site. The government then took charge of them, brought them into the central office, and they operate our system in connection with their own systems in these two towns, for which we pay them $6 per phone per year, and I am glad to tell you that the system is working very well indeed. We have an excellent service. We have about a thousand subscribers within the boundaries of this municipality and parts of two adjoining municipalities, and these two towns and something like 300 miles of rural lines, and this year we are building about 70 miles more, to supply

all subscribers, most of whom declined to subscribe when we first commenced building our system."

Hon. W. H. Cushing, minister of railways, telegraphs and telephones in Alberta, stated that in 1908 the question of giving farmers direct telephone connection with their nearest town and the establishment of local exchanges in the more populous communities was taken up, and the department of public works was overwhelmed with petitions from all parts of the province to build telephone lines. These petitions were taken up in their turn and each dealt with on its own merits. Construction was at once pushed ahead and during the year 884 miles of line were built.

To sum up the work: In 1907, 544 miles of line were built, and 884 miles in 1908, or a total of 1,428 miles of line. Eight new exchanges were also constructed in 1908. At the present time there are in operation 1,842 miles of long-distance lines, 724 miles of rural lines, 97 toll stations, and 50 exchanges, giving telephone connection to 5,500 subscribers, and have up to the present rebuilt 13 exchanges.

The appropriation for this year consists of 307 miles of long distance line and 410 miles of rural lines, and by the end of the year, just a matter of three years since the government undertook the management of the telephone system, it will have 2,873 miles of line in operation.

At the time of the Bell purchase the standard rate for exchanges of 200 subscribers or less was $30 for a business telephone and $20 for a residence telephone. Before the purchase when the government established its first exchanges, the rate charged for exchanges was $24 for business and $15 for residence. After operating for some time it was found that the government could operate safely and without loss at these rates. At the time of the purchase, therefore, all exchanges paying the old rate of $30 and $20 were reduced to $24 and $15. At the larger centers, such as Calgary and Lethbridge, the Bell rate was $35 and $25. It was not thought profitable to reduce the rate for business at an exchange of this size, but the residence was cut to a flat rate of $20.

The Bell toll charges over long distance lines for a certain distance—up to fifty miles—was one cent per mile; the government reduced this to about half a cent per mile, with a lower rate in proportion as the distance was greater; this has all been done after careful deliberation.

The government feels that the telephone system in Alberta will support itself and the service given be of the very best. The very best of construction material is used, and everything built upon most up-to-date methods.

The Strowger automatic system which was first installed in the city of Edmonton has proven very successful and appears to be one of the best systems of its kind today. The government is therefore installing this system at the city of Lethbridge and in a new exchange in East Calgary.

Plans for Illinois Convention

Decatur has been selected to entertain the annual convention of the Illinois Independent Telephone Association this year. The telephone men will be in session at one of the local hotels on November 10 and 11. Arrangements will be made for the accommodation of 150 visitors.

Many questions of current and permanent interest to the operation and maintenance of telephone systems will be discussed, and the meeting is looked forward to as one of great importance to the furtherance of the independents' interests.

The local committee in charge of the arrangements is composed of J. A. Portwood, C. B. Cheadle and J. W. Collins.

Headquarters will be obtained at either the St. Nicholas or the Decatur hotel, and the sessions will be held in some place convenient to one of these places.

Mr. Cheadle is in active charge of the perfection of details of the meeting. It was planned to have the convention earlier than November 10, but after a conference with Manford Savage, of Champagne, president of the association, it was decided that, because of other business, it would be impossible for the telephone men to meet previous to the date set.

Mr. Cheadle takes special interest in the success of the convention not only because of the fact that he is interested in the objective business of the meeting, but because he was one of the men prominent in the organization of the association in Peoria five years ago. He was elected secretary of the association at that time, and held that office until last year, when he refused nomination to the position.

Speaking of the questions which probably will come before the conference, Mr. Cheadle said:

"One of the most important topics and one that will interest everyone connected with the independent telephone business is that of a clearing house for the adjustment of the tolls for long distance calls.

"The present system of the adjustment of remuneration for service, where more than two different companies are included in the long distance call, is inadequate and unsatisfactory.

"It is now proposed to establish this clearing house, where the proportionate fees due to the companies will be computed, and settlements made by this method, instead of by inter-company arrangements that are now in effect. Of course this clearing house would have jurisdiction only over cases where more than two companies participate in the service, since where there are only two companies interested, the settlement will be made direct.

"The representation at this convention without doubt will show the growth of the independent telephone industry in the state. The independents have experienced a healthy growth in the last few years, and there are more telephones in the state outside of Chicago under the direction of independent companies than there are Bell telephones. In the city of Chicago, of course, the Bell telephones have a much greater number of subscribers."

Venezuelan Telephone Service

Consul Isaac A. Manning, of La Guaira, forwards a directory of the Venezuelan Telephone and Electric Appliances Company, an English concern with $500,000 invested, and reaching numerous towns, with Caracas as a center. The manager states that the company will soon begin the installation of metallic circuits on all lines.

The company holds no time concession from the government, therefore no monopoly of the telephone rights, but it grants the Venezuelan government a free service, governmental and municipal, and in return is immune from direct taxation and has the privilege of importation at 50 per cent discount from regular duties.

Items of Legal Interest

By Ralph M. Loring

DUTY TO FURNISH SERVICE.

Telephone companies are, to a limited extent, common carriers of intelligence and news, and are bound to afford equal facilities to all in like situations; and, where a patron has been delinquent, and further service refused for that reason, the service must be restored on payment of the amount due and tender of the price of service, with compliance with the reasonable rules of the company, and where further service has been refused a patron because he has annoyed other patrons by interrupting conversations and using profane or indecent language, but who refrained from annoying the other patrons after he was notified not to do so, the company may be required to restore the service. *Huffman* v. *Marcy Mutual Telephone Company. Supreme Court of Iowa.* 121 *Northwestern* 1033.

CONTRACTS FOR EXCLUSIVE CONNECTIONS.

Under the public policy of the state of Ohio, as evidenced by the decisions of its courts and its general statutes relating to monopolies and contracts in restraint of trade, a contract between a local telephone company and a long distance telephone company for a connection between their lines and the use of the local lines for the sending and receiving of long distance messages, which binds the local company not to permit any similar connection by any other long distance company for a term of ninety-nine years, thus disabling it from giving its subscribers the benefit of competition in long distance service and from extending the field of such service beyond the lines of the other party, is void both as tending to create a monopoly and as denying to persons similarly situated the same privileges accorded to others. Conceding that a local company is not bound to permit any long distance connection with its exchange, yet when it extends that right to one company it is under legal duty as a public service corporation to extend the same right to others. *United States Telephone Company* v. *Central Union Telephone Company. Circuit Court, Ohio.* 171 *Federal* 130.

SUIT INVOLVING VALIDITY OF CONTRACT.

To a suit by a long distance telephone company having exclusive contracts with local companies binding the latter not to make or permit connections with their lines by any other long distance company for a term of years, to enjoin other companies doing a long distance business from making connections and interchanging business with such local companies in violation of their contracts with complainant the local companies are indispensable parties, the validity of the alleged contracts between them and complainant and their rights thereunder being necessarily involved. *United States Telephone Company* v. *Central Union Telephone Company. Circuit Court of Ohio.* 171 *Federal* 130.

LICENSES.

Under Act April 17, 1905 (P. L. 183), relating to license fees on public service corporations which have poles, wires, conduits, or cables in public streets, the court, in determining the amount of the annual license fees, is controlled by the cost of inspection and regulation to the municipality; and, where there is no inspection or supervision, no license fee can be imposed. *Delaware & Atlantic Telegraph & Telephone Company's Petition. Supreme Court of Pennsylvania.* 73 *Atlantic* 175.

LANDOWNER'S PERMISSION TO TRIM TREES

Where a landowner's contract with a telephone company authorized it to trim trees interfering with the wires on all the landowner's land in J. county, the owner could not claim that the contract related only to land occupied by him, and not to land owned by him, but occupied by others, in the absence of an averment of fraud or mistake in the execution of the writing. *Nachand* v. *Cumberland Telephone & Telegraph Company. Court of Appeals of Kentucky.* 120 *Southwestern* 319.

PRIVITY BETWEEN INVENTORS.

Mere delay in applying for a patent after an invention has been made does not operate as an equitable estoppel which defeats the right of the inventor to a patent in favor of another, where he was the first true inventor and, notwithstanding the delay, was the first to apply for a patent, and to make public and market his invention. *International Telephone Manufacturing Company* v. *Kellogg Switchboard & Supply Company. United States Circuit Court of Appeals.* 171 *Federal* 651.

DELAY IN APPLICATION FOR PATENT.

The fact that the inventor of a device did not apply for a patent until six years after it had been perfected, and successfully tested, did not operate as an abandonment or dedication to the public, in the absence of proof of anything indicating such an intention, such as a public use or publication. *International Telephone Manufacturing Company* v. *Kellogg Switchboard & Supply Company. United States Circuit Court of Appeals.* 171 *Federal* 651.

INJURY TO LINEMAN.

Where an experienced telephone lineman is sent out to lower a messenger wire, because too close to an electric light wire of high voltage, and the wires are brought in contact, either by his act or by the breeze blowing at the time of his lowering the wire, it is an act of negligence on his part to touch the wire while standing on a copper roof, barring recovery for the resultant injury. *Woodward* v. *City of Taunton. Supreme Judicial Court of Massachusetts.* 89 *Northeastern* 114.

AUTHORITY TO USE STREETS.

The filing with the Secretary of State of an extension of route certificate by a corporation operating electric wires in a street after the act became effective gave no right to use the extended route, where there was no grant thereof from the city by ordinance; the extension being in effect simply an amendment of its original articles of incorporation. *In re New York Independent*

Telephone Company. Supreme Court of New York. 118 *N. Y. Supp.* 290.

PATENT VOID.

The Dean patent, No. 687,499, for a telephone transmitter, although a combination of old elements, was not anticipated and discloses invention. Also, *held* infringed. *International Telephone Manufacturing Company* v. *Kellogg Switchboard & Supply Company. United States Circuit Court of Appeals.* 171 *Federal* 651.

Telephone Development in New England

In connection with the building of the new Newburyport central office of the New England Telephone and Telegraph Company, some very interesting figures of growth and development are given. In January, 1903, there were but 402 stations connected to this office; in January, 1909, the number of stations had increased to 1,241, or more than 300 per cent; and on the first of August there were 1,352 stations. The present board is handling about 8,000 originating local calls and about 700 toll calls per day. The new switchboard, which will be installed just as soon as the building is ready to receive it, can handle about 12,000 local calls per day and about 1,150 toll calls. By making additions to the board this number may be increased to 21,000 originating local calls, and 1,900 toll calls per day—just about the growth that is figured for the next ten years.

The accompanying cuts give some idea of outlines of the new building, which is being erected on Green street. It will be of brick construction with stone trimmings, and while there will be no special effort at ornamentation, it will be attractive in design, and dignified as well as business-like in appearance.

An innovation in buildings of this kind is the making of a second story as a retiring room for operators. In order to relieve the operators from overpressure, they are given periodical recesses through the day, and during these recesses they are privileged to go to the retiring rooms and rest, read, or play, as the desire appeals to them.

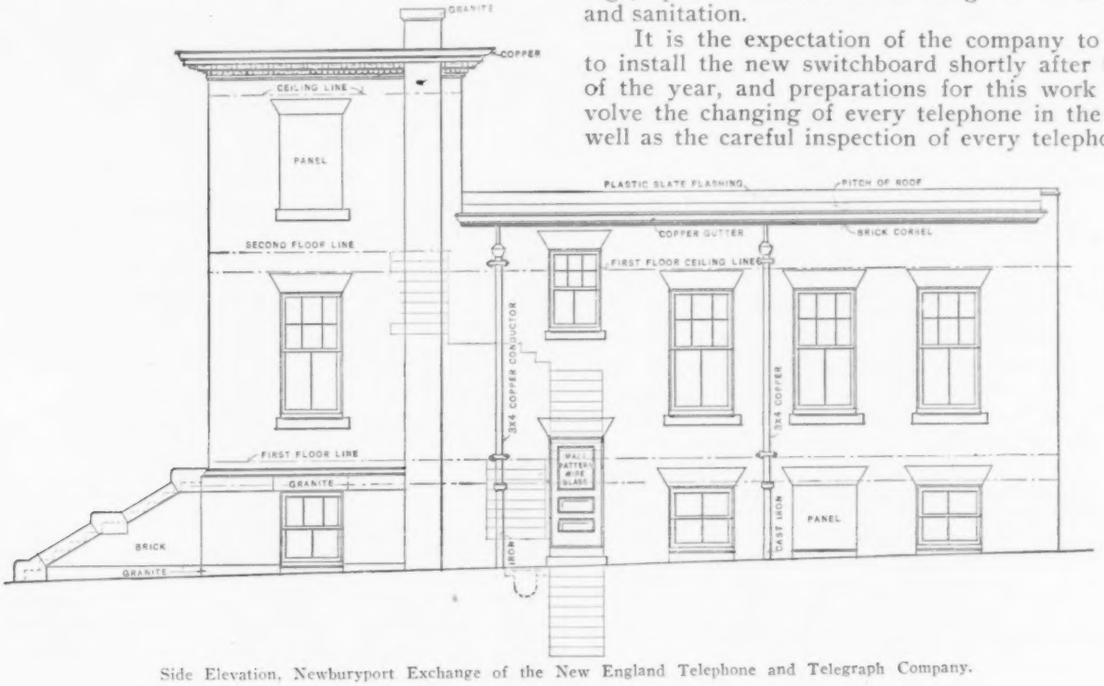
The front part of the first floor is given over to offices for the local representatives of the company,

Front Elevation, Newburyport Exchange.

and the rear is to be used as the operating room. There will also be a well lighted and ventilated basement for the use of dynamos and other parts of the plant's equipment.

The building is to be of fireproof construction throughout, and, as in the case of all telephone buildings, special attention is to be given to ventilation and sanitation.

It is the expectation of the company to be able to install the new switchboard shortly after the first of the year, and preparations for this work will involve the changing of every telephone in the city, as well as the careful inspection of every telephone line.



Side Elevation, Newburyport Exchange of the New England Telephone and Telegraph Company.

Of Interest to the Trade

The New York Electrical Show

At the electrical show held at Madison Square Garden, October 11 to 21, Dossert & Co., New York, exhibited a full line of solderless mechanical connectors, cable taps and terminals for electric cables and wires. Among the new devices exhibited was a cable tap for connecting aluminum and copper cables. This tap gives an aluminum contact at the point of connection with the aluminum cable and a copper contact at the point of connection with the copper cable.

The Manhattan Electrical Supply Company, New York, exhibited a line of general supplies in its main booth. The goods manufactured by this company include electric light specialties, medical apparatus and electrodes, telegraph and telephone apparatus, electric bells, massage vibrators, dry batteries, electric horns, jump spark coils, automobile switches, motors, dynamos, time switches, door openers, testing instruments, etc. The company also had a special exhibit of wireless telegraph apparatus.

The Southern Exchange Company, New York, exhibited sections of its octagonal and square poles, cross-arms for telephone, electric light and transmission lines. The booth was tastefully decorated and enhanced by large pictures of the company's mills and yards in the south. The company makes a specialty of high-grade cross-arms, yellow pine octagonal and square poles, and is the pioneer producer of the southern white cedar poles.

Collins Wireless Telephone Company, Newark, N. J., displayed as leading features in its booth a variable tuning transformer, auto-transformer and rotating oscillation arc. These are the instruments which it is claimed were employed by Mr. Collins in talking from New York to Philadephia without wires. The Collins transmitter was also on exhibition. This is a compact device made of brass, nickel and ebony. High-frequency and high-potential apparatus, induction coils and transformers for therapeutic, ignition and wireless work were shown.

The Murphy Electricity Rectifier Company, Rochester, N. Y., exhibited a rotary disk type of rectifier and also a stationary electrode type. The latter possesses an advantage over the former in being self-starting and in eliminating all moving parts with the exception of a small synchronous motor. It is, moreover, much smaller and simpler in construction. The device is applicable to a large number of uses, including the charging of batteries for electric carriages, telephone, fire alarm systems and car lighting, also for moving picture machines, electroplating, x-ray work and other purposes where direct current is required and an alternating current source only available.

The Electric Storage Battery Company, Philadelphia, showed one element of type H-131 Exide battery. nine standard sets of vehicle batteries as built for electric vehicle companies, exide sparking duplex and emergency sparking batteries, car-lighting batteries, a two-cell unit for this service, automobile electric head lamps operated by exide sparking batteries, and a casting mold electrically operated for casting souvenirs, consisting of lead disks bearing the imprint of the company.

DeVeau Telephone Manufacturing Company, New York, exhibited various lines of telephone apparatus, including intercommunicating telephone systems, apartment house telephones, branch exchanges, mine telephones, parts of telephone apparatus, a Woodruff carriage call system, annunciators, alarms, etc.

The Storage Battery Supply Company, New York, exhibited the Hudson-Fulton storage battery intended for Christmas tree outfits and similar uses. A hydrometer syringe, electrolyte tester and electric dome lamps completed the display.

Railway Train Dispatching News

The Michigan Central railway has just completed a telephone train dispatching circuit between Niles, Mich., and Kensington, Ill., a distance of seventy-six miles. There are eighteen regular train order stations and two emergency stations. The emergency stations are for the use of train crews and are so arranged that a crew may at any time stop at these sidings and call up the dispatcher to obtain assistance, if necessary, or get instructions to go ahead if the track is clear. Orders received in this way will be handled with the same care and precision as those at the regular stations. The order from the dispatcher to the conductor is written out by the conductor, repeated back to the dispatcher, approved by each, a copy given to the engineer, one retained by the conductor and a third left in the register for the company's records.

This installation is on the main line of the Michigan Central Railway, between Chicago and Detroit, and is the fourth circuit of this kind installed by this road. When the circuit now being installed between Jackson, Mich., and Niles, Mich., is completed, all trains run between Chicago and Detroit, Detroit and Toledo, and Detroit and Saginaw, on the Michigan Central Railway, will be dispatched and receive all running orders by telephone. This entire equipment of about 500 miles, one-fourth of the entire Michigan Central mileage, was furnished by the Western Electric Company, and is reported as giving excellent satisfaction. It is reported that extensions will be made as expeditiously as possible until every train on this road receives its orders by telephone.

The Lake Shore & Michigan Southern Railway Company has ordered telephone equipment, and is making provision to equip for telephone train dispatching the Youngstown division of its road, and is makin the new Clearfield branch a part of its telephone system.

This is the second circuit on this road to be equipped with Western Electric telephones for train dispatching. The first circuit, between Buffalo and Erie, has been in service more than a year. It is being clearing recognized now by the majority of the larger roads that the telephone has passed the experimental stage for this class of service.

The Norfolk & Western railroad has recently put into service two telephone circuits for handling its trains, one between Roanoke, Va., and Bluefield, W. Va., 102 miles, the other between Bluefield and Williamson, W. Va., 107 miles. There are sixteen stations on the former circuit and twenty-two stations on the latter. The Western Electric Company's tele-

phone equipment and Gill selectors are used on both circuits.

This equipment extends through some very mountainous country and affords a good test of telephone train dispatching under very severe conditions. This equipment has been in service since September 25, and Mr. W. C. Walstrum, superintendent of telegraph, reports that both circuits have been giving excellent service since that time. A feature of interest in connection with one of these circuits is that the telephone was pressed into service before being fairly completed owing to telegraph circuits having gone out of commission, due to the recent widespread electrical disturbance attributed to the aurora borealis, or northern lights.

Hubbard Acquires Peirce Properties

Through a deal which has been pending for some time between Hubbard & Company, Pittsburgh, and the Peirce Specialty Company, the latter retires from the manufacturing business, but retains its corporative existence, having sold its factory and leased its patents to Hubbard & Company.

Hubbard & Company are large manufacturers of line material, and the Peirce business is being taken over as a separate department of which C. L. Peirce, Jr., will be in charge.

The factory at Elkhart will be maintained until about the first of the year, awaiting the completion of a new steel and concrete building now being erected for it at the main works of Hubbard & Company, at Pittsburgh.

New Books

Transmission Line Crossings, by Frank F. Fowle, deals with the protection of railroads from overhead transmission line crossings. It consists of a paper prepared for the twenty-seventh annual convention of the Association of Railway Telegraph Superintendents, at Montreal, Canada, June 24 to 26, 1908, and was not originally intended for publication in book form. The work was not completed in time for presentation at the convention, however.

The author has evidently devoted a considerable amount of study to a subject of great and growing importance. The common and increasing use of dangerously high potentials transmitted on aerial lines renders a careful consideration of the problems discussed in this volume necessary to every man in the electrical field. All telephone men are familiar with the difficulties encountered with high tension crossings and joint-pole work, and will consequently find much of value in Mr. Fowle's treatment of the subject.

The book outlines a form of specification covering the general principles, materials and types of construction involved, and considers a typical case. An abundance of scale drawings and half-tone illustrations from photographs add greatly to the practical value of the work.

Published by D. Van Nostrand Company, New York; 69 pages; green cloth covers; price, $1.50.

Branch's Chart Book Series, for students, high schools and colleges, is the latest product of the pen of Joseph G. Branch, author of "Conversations on Electricity," etc. The first of the series, "The Dynamo," is a simple explanation of the growth and construction of the electric generator. Its text is lucid and comprehensive in the extreme, and no reader can fail to grasp the principles of electromagnetic action and the generating of electric current through such action.

But the strongest feature of the book is its full page plates or charts. These follow the course of the text from Oersted's discovery to a complete multipolar generator, and all of them are remarkably clear and sharp. They are printed in two colors, the electrical conductors in each case being made distinct by a superimposed impression of yellow.

Published by the Branch Publishing Company, Chicago. Price 50 cents boards, 75 cents cloth covers.

Improved Pocket Meters

Those engaged in electrical pursuits have become so accustomed to the large power installations of the present time, that they are apt to lose sight of the fact that units of energy immense in the aggregate are being used in the shape of dry cells and small storage batteries. It is undoubtedly true that the daily production of batteries in this country, measured by their kilowatt-hour capacity, would prove a revelation to most of us.

So wide-spread has the use of batteries become that the demand for small pocket meters with which to test them has grown to considerable proportions.

The Hoyt Electrical Instrument Works early recognized the importance of this field, and has devoted a great deal of attention to it, the latest product being a line of ammeters and voltmeters approximately the size of a man's No. 16 watch, the novel feature of which is a silver plated metal scale which combines accuracy, durability and tastiness in design.

Realizing that the first requisite was a careful standardization of every part, the concern has for some time been working along these lines, and claims to have designed every part so carefully that exhaustive tests have failed to show any material error in any part of the scale.

These meters are of the permanent magnet type, and in designing them the purpose of their use has been constantly kept in mind. The relation of the moving system to the poles of the permanent magnet is such as to insure a practically dead beat movement, with extreme sensitiveness to current changes.

A novel design of lettering has been adopted for the dial, and it is the purpose of the makers to carry out the same idea in all instruments of this type to distinguish them readily from other meters of somewhat similar general appearance.

The trade has taken very kindly to the instruments, and the letters received so far by the makers comment very favorably on them.

First T. P. A. Meeting

The first of the Technical Publicity Association's monthly meetings for 1909-10 was held Thursday evening, October 14, in its headquarters, 14 Gramercy Park, New York. There was a good attendance. All enjoyed the informal dinner, after which came an interesting programme.

The president of the association, Charles S. Redfield, advertising manager of the Yale and Towne Manufacturing Company, was toastmaster. The only extended

address was that of George French, editor of *Advertising and Selling*. Preceding his remarks the attention of the members was occupied with reports of committees. The chairmen who were called upon outlined the work to be done during the winter months.

Howard M. Post, advertising manager of the Western Electric Company, told of plans for a systematic, analytical study of effectually tracing results from trade paper advertising. The keying method, he said, has proved inadequate. There should be some way of determining the effect of such advertising, declared Mr. Post. At the conclusion of a discussion of this subject in which every point of view was presented, Mr. Post was made chairman of a committee to outline this study work for the association.

"It is about time for advertisers to cease to shy at that word psychology," said Mr. French. His remarks were an interesting presentation of the psychological and artistic aspect of advertising. His hearers were taken into the field of optics, and shown the effect advertisements have upon the eye of the reader.

Mr. French re-stated his thesis in the words:

It is from science and pseudo-science, from art and physiological-psychological questions such as optics, the groundwork of advertising, that we can gather a great fund of strength and knowledge. Not only that, but it is a delightful field to grub around and study in.

Mr. French spoke throughout with much earnestness. His talk was highly appreciated by the advertising men present, among whom were a number of trade paper publishers. Questions were asked during the course of his remarks and a lively discussion ensued at the close.

After disposing of business matters the association adjourned, to meet again in the same place on November 11th. All voted the October meeting a highly interesting and profitable one.

A Cartridge Two-Cell Motorcycle Coil

The Cartridge Coil Company, Lafayette, Ind., has recently placed upon the market a new type of motorcycle coil which requires but two cells of dry battery for its operation, and is said to be more efficient than the old style three battery coil. The manufacturer of this coil reports that actual tests have shown that with two cells of battery this coil has been able to operate a single cylinder machine 1,200 miles without requiring a replacement of the batteries.

The cartridge coil is made the same size as a dry battery and therefore can be placed in the battery box within the same space previously occupied by the third cell of battery. This arrangement has several advantages, first, that it improves the appearance of the machine and removes several pounds of the weight; second, that it gives the coil protection that will materially increase its life and efficiency; and, third, it shortens the connecting cables.

There have been several attempts to produce a motorcycle coil that will operate successfully on two batteries, but this appears to be the first coil that has been successful. This coil will, no doubt, hold its own against the tendency toward the adoption of magnetoes for the motorcycle, which seems to be on the increase.

It would seem that with a coil of this character available that there would be little wisdom in loading a motorcycle with the additional weight of a magneto, to say nothing of the added difficulty in starting the machine, that almost always attends the use of magneto ignition.

The Cartridge Coil Company, 5 Mechanics street, Lafayette, Ind., would be glad to send its literature on this coil to any one interested.

Harvard Electric News

The Harvard Electric Company, 525 West Van Buren street, Chicago, Ill., announces that its sales manager has just returned from an extended trip through the east in the interest of Harvard patented galvanized channel steel brackets, sectional switch boxes, bevel edge self-welding wire joints and other Harvard specialties. The brackets and joints particularly met with great favor among the engineers of telephone and lighting plants, while the sectional switch boxes were much praised by the central stations and the contractors. The Harvard bracket is rapidly supplanting the old style wooden and malleable iron bracket on account of its great strength, lightness and galvanizing, which makes it long lasting.

The company has just issued Bulletin No. 19, relating to brackets, sectional switch boxes, conduit boxes, telephone fuses, wire joints, etc. In this bulletin there is given a detailed description of the various Harvard specialties, dimensions, etc. Harvard specialties are used by the Bell and larger independent telephone companies, electric light companies and electrical contractors.

Western Electric Report

The Western Electric Company completed with September five-sixths of its fiscal year, and it is now possible to estimate the results for the entire year, which should show a gross business close to $47,000,000, or 42.5 per cent greater than for 1908.

Indications for the next year are favorable and the officers of the company expect 1909-10 will show an increase of at least 20 per cent. On this basis next year's gross sales will be in the neighborhood of $57,000,000.

September sales ran very close to those of August and showed an increase of 50 per cent over September, 1908, the improvement being noted in all lines of the company's business. September is the first month to feel the stimulus of fall business and makes up with October and November the best three months in the latter half of the fiscal year.

The electrical business in the south has suffered from the damage to crops, but the improvement in other sections of the country has considerably more than offset the loss.

Growth in the business of the Western Electric Company at the present time is taking place most rapidly in the region west of the Mississippi river. The company has recently increased its facilities in Omaha so that that branch now handles electric light and electric supplies in addition to telephone supplies. If the rate of growth noted during the current year extends into next year, as now seems certain, the company will be obliged to increase its manufacturing facilities at Hawthorne.

At the present time there are 17,000 employes on the company's payrolls as compared with 13,000 a

year ago, or a gain of about 30 per cent. The greatest number which the company employed at any one time was 29,000 in 1906.

Correspondence.

Editors Telephone Engineer: Referring to article in your September issue headed "Wooden Poles and Ties," the article has evidently been offered you by some southern operator and not by one who is in position to judge the real situation as pertains to wooden poles and ties. In the first place "the enormous and steadily increasing demand for wooden poles and ties" may have depleted the forests in the northeastern states to some extent. In Michigan, Wisconsin and Minnesota, however, there is a large quantity remaining. There is sufficient standing cedar in Michigan today to furnish a half million poles, 20-foot and larger, per year for the next twenty years. About half of this amount can be produced each year in Wisconsin, and in Minnesota there is sufficient standing cedar to produce a million poles per year for the next twenty years.

It seems a shame that any one should bring forward southern timber and dare to compare it with northern or western cedar in general desirability and lasting qualities. Furthermore in comparing costs northern cedar today is cheaper in poles and ties than it has been at any time in the last seven years.

Southern yellow pine is undesirable owing to its short life as ties or poles unless creosoted or treated in some way to extend its life, and even if so treated will not add materially to its length of life as compared to same treatment of northern or western product. A northern cedar pole or tie will outlast it three times unless the southern product is treated; we mean by northern cedar not only the Michigan, Wisconsin and Minnesota product but the cedar that is produced in Washington, Idaho and British Columbia. The Michigan, Wisconsin and Minnesota poles in their natural state and the western product treated with creosote or some good wood preservative shows a great saving over the southern product.

In view of the prices that are now being offered by the northern producer, and the slight expense required covering the treatment of western product no consumer can afford to use the southern product either treated or untreated.

In the latter part of your article you state that the cypress round pole is said to be the future round pole. Our judgment leads us to make the statement, after careful investigation, that there will be still produced Michigan and western cedar for ties and telegraph poles after what little cypress there is has all been exhausted.

The last of your article reads as follows: "Cypress is very porous and when used in a cold climate great care should be taken to house and seal the tops of poles thoroughly." We suppose this being a southern timber it could not be consistently used in the north during the winter months when it would be subject to severe colds, pneumonia, etc., and it is very certain from this article that the pole that Dr. Cook found was not of cypress or yellow pine, but possibly of cedar, which is used everywhere in all kinds of climate in its natural state and does not have to be housed and sealed.

E. L. Clark,
President Northwestern Cedarmen's Association.

German-American Patent Treaty

The American Association of Commerce and Trade in Berlin has issued an announcement on the effect of the new patent treaty between the United States and Germany. This treaty, which went into effect on August 1, places American citizens on a decidedly better footing in regard to the utilization of patent protection in Germany, as it frees them from the obligation to work their patented inventions in Germany within three years from the granting of the German patent. Heretofore any failure to comply with this working obligation would, in the case of an action for revocation of the patent being brought against the patentee, result in the loss to him of his German patent.

The new treaty provides that the working of a patent in the territory of one of the contracting parties shall be considered as equivalent to its working in the territory of the other party. Hence, an American citizen who works his United States patent in the United States will no longer be required to work his corresponding German patent in Germany in order to avoid loss of the German patent in case of an action for revocation being brought against him.

The new treaty, abolishing, as it does, a condition of affairs that has been felt as a hardship by Americans, will no doubt induce many American inventors to apply for German patents where they would otherwise have absbtained from so doing.

New Stromberg-Carlson Literature

The Stromberg-Carlson Telephone Manufacturing Company has just published a booklet entitled "How the Telephone Helps the Farmer," that comes as near being a work of art as any advertising literature could. Not only are the articles and stories of rural telephony it contains extremely readable and pleasing, but the pen drawings which illustrate the text are veritable gems.

The booklet also contains interesting views of the company's factory and product and gives valuable information to the prospective line builder.

A new bulletin (No. 1000) of their telephones and switchboards is also very interesting to users of such apparatus.

Dean Literature

The Dean Electric Company has issued a very neat booklet of intercommunicating telephone apparatus, describing in detail the operation and merits of the Dean system.

A clever little folder, labeled on the front, "What We Know About the North Pole," containing two blank pages on its interior, the back cover calling attention to the patrol flash-light police and fire alarm system, also emanates from the Dean house.

Swedish-American Bulleins

The Swedish-American Telephone Company, as prolific of printed matter as ever, is sending out some very interesting booklets and bulletins. A new edition of the Swedish-American rural telephone book, Catalogue No. 30 of telephone switchboards and apparatus, and a card descriptive of the new switchboard magneto, are among the contents of the envelope.

Roebling Gets Prizes

The John A. Roebling's Sons Company has received ten grand prizes, the highest awards, for its exhibit at the Alaska-Yukon-Pacific exposition. A grand prize was awarded the company for its general exhibit and similar prizes were bestowed for different articles shown. Among the Roebling products thus honored were telephone and telegraph wire and telephone cables.

"Copper Clad" Business

The Duplex Metals Company reports orders for its copper clad steel wire from eighteen railroads, aggregating some 9,600 miles of wire, varying between No. 9 and No. 14 gauge.

Brevities of the Business

PERSONAL NOTES.

S. T. Yager, Owensboro, Ky., has been appointed manager of the Roberts Telephone Company, Abilene, Texas.

George Talcott has been appointed manager of the Geneseo Telephone Company, Geneseo, Ill.

Prof. George C. Shaad has resigned his position as assistant professor of electrical engineering in the Massachusetts Institute of Technology, to take charge of a similar department in the University of Kansas, and will be succeeded by W. E. Wickenden.

Guy H. Gibbs, who has been with the Westinghouse Electric & Manufacturing Company for the past eight years, four of which have been with that company's Cincinnati office, is now with the Western Electric Company at Cincinnati.

Edward Patrick, formerly connected with the Northwestern Telephone Exchange Company at Minneapolis, has accepted the position of superintendent of traffic with the Dakota Central Telephone Company, Aberdeen, S. D.

Clyde Talley has been appointed manager of the Western Telephone Company, Roseville, Ill., to succeed Fred McElvain, resigned.

Charles S. Gleed, Topeka, Kans., president of the Missouri and Kansas Telephone Company, has been elected president of the Bell Telephone Company of Missouri, to succed Cyrus P. Walbridge of St. Louis.

Thaddeus S. Lane, managing director of the Montana Independent Telephone Company, Butte, Mont., has been elected president of the syndicate recently organized to purchase the Home Telephone Company of Spokane.

CONVENTIONS.

The Illinois Independent Telephone Association will hold its fifth annual convention at Decatur, November 10 and 11.

The International Independent Telephone Association will hold its annual convention in Chicago, December 7, 8 and 9.

NEW TELEPHONE COMPANIES.

SMITHVILLE, ARK.—The Smithville Rural Telephone Company has been incorporated with the following officers: President, Martin C. Garner; vice-president, B. F. Coffman; secretary, John R. Barnett; treasurer, A. D. Taylor; capital stock, $6,000.

SAN FRANCISCO, CAL.—The Home Long Distance Telephone Company was recently incorporated with a capital stock of $10,000,000, for the purpose of constructing lines to different parts of the state. Among those interested are H. G. Holabird of Los Angeles, L. S. Beedy, A. S. Keeler, James Lanagan, A. Coxhead, Guy Knapp and J. E. O'Brien.

DANVILLE, ILL.—The Vermillion Grove Telephone Company has been incorporated by John M. Kendall, C. M. Hester, Paris J. Pugh, T. H. Rees and C. M. Fellers. Capital stock $5,000.

BARRY, ILL.—Articles of incorporation have been filed for the Hadley and Elders Telephone Company, with a capital stock of $2,000. The incorporators are M. C. Brown.

GOLDEN, ILL.—Articles of incorporation have been filed for the Golden Farmers' Telephone Company; capital stock $3,500. The incorporators are Phillip Cain, Scott Taylor and D. G. Buss.

ASHLEY, ILL.—The Ashley Telephone and Telegraph Company has been incorporated by H. A. Walker, C. H. Walker and M. Key, with a capital stock of $5,000.

REDDINGTON, IND.—Articles of incorporation have been filed for the Redding Township Mutual Telephone Company. The capital stock is $3,000, and the incorporators are as follows: Thomas Gillespie, John Fox, William Russett, John A. Machino and others.

SHENANDOAH, IOWA.—A Mutual Telephone Company has been organized with the following officers: President, Dr. Allen; secretary, M. M. Halbert.

HOISINGTON, KANS.—The Verbeck-Hoisington Telephone Company has been organized with the following officers: President, J. C. Lowry; secretary and treasurer, Jess Norton.

LUCAS, KANS.—A new local telephone company has been organized with a capital stock of $12,000 and the officers are as follows: President, F. A. Vopat; treasurer, C. M. Lansburg; secretary, J. H. Moore. It is the purpose of the new company to purchase the local system and improve it.

HARMONY, KY.—The Harmony Telephone Company has been incorporated by W. A. Higgins, J. L. Fulks, I. G. Gray and M. E. Wilcox; capital stock, $1,000.

READING, KANS.—A local telephone company has been organized with the following officers: President, J. F. Clark; vice-president, Sam Johns; secretary, Bert Riggor.

HOLLOWAY, KY.—The Holloway Telephone Company has been incorporated by N. C. Horn, Berry Logsdon, Chester Cummings and others; capital stock, $1,000.

CORNETTSVILLE, KY.—The Cornettsville Telephone Company has been organized with Wm. Cornett as manager; capital stock, $1,000.

TOMPKINSVILLE, KY.—The Tompkinsville Telephone Company has been incorporated by D. Kefauer, R. V. Evans and L. M. Willis.

HICKMAN, KY.—Articles of incorporation have been filed by the Lower Bottom Telephone Company with a capital stock of $10,000. The incorporators are C. T. Bandurant, R. T. Tyler and D. B. Wilson.

HUTCHINSON, KANS.—The Southwest Kansas Independent Long Distance Telephone and Telegraph Company has been incorporated with the following directors: C. A. Sloan, Pratt; R. A. Branon, Minneola; F. A. Gresham, Bucklin; Robert Burns, Hutchinson.

LUCAS, KAN.—A new telephone company has been organized here with F. A. Vopst president; capital stock $12,000.

LIBERTY, KY.—The Big Telephone Company has been incorporated by James A. Hines, J. B. Wesley and G. E. O. Watson.

CORNETTSVILLE, KY.—The Cornettsville Telephone Company has been organized by William Cornett and Arcy Cornett; capitalization $1,000.

CODYVILLE, KY.—The Codyville Telephone Company has been organized with a capital stock of $1,000. J. C. Smith is manager of the company.

WITCH, KY.—The Defeated Creek Telephone Company was recently organized by W. M. Brown and others, Mr. Brown being manager of the company.

JESSE, KY.—The Jesse Telephone Company has been organized with a capital stock of $2,000 by James E. Brown and others.

PILOT ROCK, KY.—The Pilot Rock Telephone Company has been organized by Wilson Allen and others; capital stock $500.

EAST HEBRON, MAINE.—The East Hebron Telephone Com-

AUGUSTA, ME.—The Sonora Telephone Company has been incorporated with a capital stock of $600,000 by J. Herbert Miller, E. C. Kilbridge, H. G. Villard, New York; Frank L. Durton, M. E. Gould, E. M. Thompson and Charles A. Wadsworth, Augusta.

BOON, MICH.—The Farmers' Mutual Telephone Company has been organized and the following officers elected: President, Samuel Richards; secretary, Carl McClure; treasurer, T. Denike.

DALTON, MICH.—The Dalton Telephone Company has been incorporated with a capital stock of $5,000. The directors are E. F. Plunkett and C. C. Plant.

ALAMO, MICH.—The Alamo Telephone Company has been incorporated; capital stock, $1,500.

STEEPHEN, MINN.—The McMahon Telephone Company has been incorporated by Richard McMahon, E. E. Johnson, Thomas B. McMahon and John Peterson; capital stock, $25,000.

LOUISVILLE, MISS.—The Winston Telephone Company has been incorporated with a capital stock of $10,000 by G. W. Jones, J. D. Fulton and others.

ST. LOUIS, MO.—The Home Co-operative Telephone Company has been incorporated with a capital stock of $2,000 by John R. Gay, Truman B. Barnes, Leroy Gayn, J. W. McCormick of Maplewood and F. A. O'Connor of St. Louis.

STOCKTON, N. Y.—The Stockton Telephone Company has been incorporated by Amos T. Carr, who will install a local telephone system in this place.

NEW YORK, N. Y.—The Telephone Newspaper Company of America has been incorporated with a capital stock of $100,000, by M. M. Gillian, 110 West Thirty-fourth street, and others.

BELFAST, N. Y.—The Alleghany Telephone Company has been organized with the following officers: President and general manager, Vernon J. Davis; vice-president, L. J. Hoerner, Buffalo; secretary, C. J. Miner; treasurer, George I. Fisk, Belfast.

ALBANY, N. Y.—The Hudson Valley Telephone Company has been incorporated with a capital stock of $25,000, by James M. Ryan, P. F. Crowe, Edward J. Kelly of New York.

JERSEY CITY, N. J.—The Continental Telephone and Tele-

graph Company, 15 Exchange Place, was recently incorporated with an authorized capital stock of $50,000,000, for the purpose of bringing under one management and control, independent long distance telephone companies, and some city systems.

Snow Hill, N. C.—The Carolina Electric Telephone Company has been incorporated.

Barton, N. D.—The Barton Farmers' Telephone Company has been incorporated by Ed Erickson, C. Myhran, E. E. Johnston and John Peterson; capital stock, $25,000.

Charleston, Okla.—The Home Rural Telephone Company has been incorporated by A. L. Rodkey, J. A. Hickory, and M. A. Treadway of Charleston, and H. J. Jordan, Protection, Kans. The capital stock is $1,500.

Sedan, Okla.—The Pecan Creek Telephone Company has been incorporated. The capital stock is $5,000 and the incorporators are P. E. Doss, Kelley Askew and J. H. Zimmerman.

Carnegie, Okla.—The Spring Valley Rural Telephone Company is the name of a new company recently incorporated by Charles Lunsford, S. A. Van Cleve, H. Kindblade and E. Okeson of Carnegie, and Isaac Johnson of Alden, with a capital stock of $2,000.

Marshfield, Ore.—The Catching Inlet Telephone Company has been incorporated by William S. Bonebrake, James S. Masters and Alfred Gunnell.

New Alexandria, Pa.—The New Alexandria Telephone Company has been organized by M. K. George, William Christie, Saltsburg; John D. McCurdy, Liverpool; C. R. Beatty, John Moffatt, William Latimer, New Alexandria; capital stock, $5,000.

Cleona, Pa.—The Cleona Rural Telephone Company has been organized with the following officers: President, G. Holzapple; secretary, H. S. Fegan; treasurer, A. H. Horst.

Allendale, S. C.—The Merchants' Telephone Company has been incorporated.

Pulaski, Tenn.—The Home Telephone Company has been organized with A. L. King, president, and Geo. P. Meadows, vice-president.

Smithville, Tenn.—Articles of incorporation have been filed for the Smithville Home Telephone Company by W. H. Davis, T. W. Wade, J. H. Christian, W. T. Hayes, E. G. Lawson and others; capital stock, $3,000.

Ripley, Tenn.—The Lightfoot Telephone Company has been incorporated with a capital stock of $4,000. The incorporators are J. H. Coughlin, W. H. Foust, W. F. Roberson, Dr. M. S. Glenn, R. L. Dennie.

Warren, Tenn.—The Warren Telephone Company has been incorporated; capital stock, $5,000. C. A. Webb is president and G. D. Gould treasurer.

Angus, Texas.—Articles of incorporation have been filed for the Angus Telephone Company with a capital stock of $1,230, by R. Knight, Thomas Ware and A. H. Bardwell.

Wills Point, Texas.—The Wills Point Telephone Company has been incorporated by L. L. Fink, E. E. Fink and H. F. Goodnight, with a capital stock of $16,500.

Alton, Texas.—A charter has been granted the Alton Independent Telephone Company. The capital stock is $1,000, and the incorporators are J. L. Printy, W. D. Wicker and H. K. Baughn.

Grundy, Va.—The Sandy Valley Telephone Company has been incorporated with the following officers: President, John A. Looney, Grundy; vice-president, Bart Belcher, Artis; secretary-treasurer, R. E. Elswick, Mouth Card, Ky. The capital stock is $4,000.

Bridgeport, Wash.—The Pearl Telephone Company has been organized by Scott Coleman.

Point Pleasant, W. Va.—The Old Town Mutual Telephone Company has been incorporated by John R. Stewart and John Clendenin; capital stock, $5,000.

Valdez, Wash.—The Valdez-Fairbanks Long Distance Telephone Company has been organized at this place.

Jackson, Tenn.—The Sun Telegraph and Telephone Company has been incorporated with a capital stock of $50,000. The incorporators are Terry F. Allen, John F. Wisdon and W. G. Timberlake, all of this city.

Hazeldean, Ont., Can.—The Hazeldean Rural Telephone Company has been incorporated with a capital stock of $30,000. The directors of the company are W. T. Shirriff, J. J. Hodgins, R. H. Grant, R. H. Steacy, H. G. Allen, T. A. Bradley, A. Bradley and W. W. Mann.

FINANCIAL ITEMS.

Richmond, Ill.—The Spring Grove Telephone Company has increased its capital stock from $10,000 to $20,000, and has changed its name to the McHenry County Independent Telephone Company.

Peoria, Ill.—At a recent meeting the Farmers' Mutual Telephone Company decided to increase its capital stock from $20,000 to $40,000.

Tremont, Ill.—The Farmers' Mutual Telephone Company of this place will increase its capital stock from $10,000 to $20,000.

Valparaiso, Ind.—The Northwestern Indiana Telephone Company has increased its capital stock from $100,000 to $150,000.

Spiceland, Ind.—The Spiceland Co-operative Telephone Company has increased its capital stock from $10,000 to $20,000, a portion of which will be devoted to improvements and extensions.

Sergeant Bluffs, Ia.—The Sergeant Bluffs Telephone Company has filed an amendment increasing its capital stock from $20,000 to $40,000.

Savannah, Mo.—The capital stock of the Mutual Telephone Company has been increased from $1,500 to $2,000.

Boelus, Nebr.—The Howard County Telephone Company has been granted permission to increase its capital stock from $24,000 to $34,000.

Columbus, Nebr.—The Platte Independent Telephone Company has increased its capital stock from $40,000 to $100,000.

Papillion, Nebr.—The Home Telephone Company has been granted permission to issue $10,000 new stock, thus increasing its capital stock to $37,500.

Plattsmouth, Nebr.—The Plattsmouth Telephone Company has been granted permission to add an issue of $45,000 to its present stock.

Stromberg, Nebr.—The Polk County Telephone Company has increased its capital stock from $66,875 to $74,875, for the purpose of making extensions and paying off its indebtedness.

Albany, N. Y.—The New York Telephone Company has filed a certificate with secretary of state showing an increase of capital stock from $50,000,000 to $100,000,000. It also filed a certificate showing it had merged the Central New York Telephone and Telegraph Company.

Warren, O.—The stockholders of the Warren and Niles Telephone Company will vote on the proposition to increase the capital stock from $100,000 to $200,000 for the purpose of installing a new common battery switchboard to meet the requirements of increased business.

Harrisburg, Pa.—The Merchants' Telephone and Telegraph Company has increased its capital stock from $100,000 to $400,000.

Roaring Creek, Pa.—The Roaring Creek Telephone Company has increased its capital stock from $5,000 to $10,000.

Richmond, Va.—The Appomattox Telephone Company has filed an amendment to its charter increasing the maximum capital stock from $5,000 to $10,000.

Reesville, Wis.—The Dodge County Telephone Company has increased its capital stock from $975 to $12,000.

St. Joseph, Wis.—The Moulton Rural Telephone Company has increased its capital stock from $3,600 to $6,000.

Schleisingerville, Wis.—The capital stock of the Washington County Telephone Company has been increased from $5,000 to $25,000.

FRANCHISES ASKED AND GRANTED.

Clinton, Ill.—J. W. Collins of Decatur and C. B. Cheadle of Joliet, president and secretary of the Decatur Home Telephone Company, are seeking to secure a franchise in this city, with a view to installing an automatic system.

Gibson City, Ill.—The Drummer Telephone Company has been granted a franchise by the city council.

Harlan, Iowa.—The Farmers' Mutual Telephone Company of Portsmouth has been granted a franchise to operate a telephone system in Harlan.

South Bend, Ind.—The Citizens' Mutual Telephone Company has been granted permission to operate in this locality.

Garnett, Kans.—S. C. Byee has been granted a franchise to construct a telephone system.

Washington, Pa.—The National Telephone Company has been granted a franchise to operate its lines in the borough of East Washington.

Havre, Mont.—The Montana Independent Telephone Company is seeking a franchise to enter this city.

Medora, N. D.—M. C. Caffrey has secured a franchise to construct a telephone system in Billings county.

Rapid City, S. D.—The Black Hills Independent Telephone Company, recently incorporated, has been granted a franchise to install a telephone system in this city.

Waterville, Wash.—The Dyer Telephone Company has been granted a franchise to construct telephone lines throughout the country.